

MARINE REVIEW

Entered at Cleveland Post Office as Second-class Mail Matter.

VOL. XXIV.

Published every Thursday at 418-19 Perry-Payne Bldg., by the Marine Review Pub. Co.

CLEVELAND, O., JULY 18, 1901.

Subscription \$3.00 a year.
Foreign \$4.50 a year.

No. 3

FULL FIVE MILLIONS IN SHIPS FOR NEXT YEAR.

Eighteen steel steamers already under order with the American Ship Building Co. (consolidated lake yards) for delivery in 1902 are to cost \$5,035,000. Fifteen of them are freighters of 4,800 to 6,200 tons capacity each, and their combined cost is \$3,480,000. Their combined capacity is 78,900 gross tons on 18 ft. draught, so that in a season of say twenty-three trips they would move about 1,850,000 gross tons. The passenger steamers, two for the new Detroit & Buffalo line and one for the White Star line of Detroit (a duplicate of the Tashmoo), are all to be built in Detroit and will cost about \$1,555,000. This high figure is due to the great size and immense power of the two sidewheelers that are to be built for the Detroit-Buffalo service.

The several works of the big ship building company are, of course, not yet entirely filled, even for the winter, but it would seem from orders in sight that before the present month is at an end they may have enough new work on their books to run them into the latter part of next summer. There is some doubt about a single order for ten steel steam freighters that has been under consideration for two weeks past, but it may yet be placed, as a very large part of the funds necessary to closing the deal has been subscribed. The parties trying to make up the company that is to place this order are W. H. Perine, well known in marine insurance circles, and Capt. W. W. Brown of Cleveland, who are said to have started with a subscription of \$600,000 from Charles Counselman, grain merchant of Chicago, who controls four ships built at Chicago within the past year and now in service between Chicago and European ports. Particulars of

LARGE FLEET OF VESSELS HAULING FROM DULUTH.

As a result of an act of the Minnesota legislature, a short time ago, fixing the tax on vessel property at only 2 cents per ton register, the customs district in which Duluth is located will soon have the lead on the lakes in the registry of vessels. With the close of last month, the end of the government fiscal year, there were registered at Duluth 287 vessels of 371,776 gross tons. This tonnage probably exceeds either Cleveland or Buffalo, ports which have held the lead for a great number of years past. It will be noted that the average tonnage of the 287 vessels hauling from Duluth is about 1,300, showing that the list includes a great many vessels of the largest class. This sudden increase in tonnage at the head of the lakes is due principally to the plan of transferring of all vessels of the United States Steel Corporation to that point. Not all the vessels of the Steel Corporation fleet are as yet documented at Duluth, so that the increase will continue. Twenty-two ships of the Minnesota fleet, controlled by the Steel Corporation, are to be transferred this month, involving an increase of about 75,000 tons. Of course the business in which these vessels are engaged at Cleveland and other Lake Erie ports is not affected in the least. There will be no loss to the places where they have been documented in the past except as regards taxes and the pride that attaches to a large fleet hauling from any port. The Duluth law, fixing the tax at the very low figure of 2 cents a ton, gives the Steel Corporation the advantage of concentrating its fleet as to port of haul and removes the annoyances that have attended the struggle in many of the lower lake ports to collect a large share of taxes from vessel property. A few

Particulars of Eighteen Steel Steamers under order with American Ship Building Co. (consolidated Lake Yards) for delivery in Spring of 1902.

To be built in	Type.	Dimensions in feet.				Dimensions of engines.	Boilers—dimensions in ft. and in.	Draft.	Steam pressure, gross tons, 18 ft. draught.	Value.	For whom building.
		Over all.	Keel.	Beam.	Depth.						
Cleveland ..	Cargo stmr.	436	416	50	28	22, 35, 58x40....	Two Scotch, 13-2x11-6.... Ellis & Eaves..	170	6,200	\$260,000	John Mitchell and others, Cleve.
Cleveland ..	Cargo stmr.	436	416	50	28	22, 35, 58x40....	Two Scotch, 13-2x11-6.... Ellis & Eaves..	170	6,200	260,000	John Mitchell and others, Cleve.
Lorain	Cargo stmr.	400	380	50	28	22, 35, 58x40....	Two Scotch, 13-2x11-6.... Howden	170	5,600	240,000	J. C. Gilchrist, Cleveland.
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Chicago	Cargo stmr.	366	346	48	28	20, 33½, 55x40...	Two Scotch, 12-10x13.... Natural	170	4,800	220,000	Mutual Steamship Co.
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Lorain	Cargo stmr.	366	346	48	28	20, 33½, 55x40...	Two Scotch, 12-10x13.... Natural	170	4,800	220,000	W. H. Mack, Cleveland.
Chicago	Cargo stmr.	366	346	48	28	20, 33½, 55x40...	Two Scotch, 12-10x13.... Natural	170	4,800	220,000	W. W. Brown and others, Cleve.
Cleveland ..	Cargo stmr.	374	354	48	28	20, 33½, 55x40...	Two Scotch, 14x12.... Natural	170	4,900	220,000	W. C. Richardson, Cleveland.
Place not assigned...Cargo stmr.		366	346	48	28	20, 33½, 55x40...	Two Scotch, 12-10x13.... Natural	170	4,800	220,000	Not yet announced.
Place not assigned...Cargo stmr.		366	346	48	28	20, 33½, 55x40...	Two Scotch, 12-10x13.... Natural	170	4,800	220,000	Not yet announced.
Detroit	Day passenger stmr.	308	300	37-6	13-6	33, 51, 82x72....	Five of cylindrical type.				White Star Line, Detroit.
Detroit	Passenger and freight stmr.	366	350	55	19-6		Three single-ended;				Detroit & Buffalo Steamship Co.
Detroit	Passenger and freight stmr.	366	350	55	19-6		two double-ended....	170	275,000	Detroit & Buffalo Steamship Co.
							Eight Scotch	640,000	640,000	
							Eight Scotch	640,000	640,000	
									78,900	\$5,035,000	

the eighteen steamers above referred to will be found in a table on this page.

Mr. F. H. Clergue, whose water power enterprises and iron mines in and around Sault Ste. Marie, Ont., have attracted a great deal of attention, has placed an order with the Collingwood Ship Building Co., Ltd., of Collingwood, Ont., for a steel barge of about 6,500 tons capacity. The barge will be of the kind that have of late been quite numerous in the ore trade on the lakes and will tow between Michipicoten ore mines and Lake Erie ports when she comes out next spring with one of the steamers which Mr. Clergue brought to the lakes from England some time ago. Dimensions of the vessel are 390 ft. keel, 46 ft. beam and 26 ft. depth. The Collingwood yard, which was fitted up for steel ship building only a short time ago, has now well along towards the launching stage the steel passenger steamer for the Beatty line of Sarnia, Ont., which is to trade between Sarnia, Fort William and Duluth. This vessel, which is 308 ft. long, 43 ft. beam and 27 ft. depth, will be of high power and in all respects suited to first-class passenger service. She will be named Huronica.

The new steel ferry Algoma for the Sault Ste. Marie Ferry Co. was launched at the Polson Iron Works, Toronto, Can., a few days ago. The Algoma is a stoutly-built craft. The hull and deck frame work are of steel throughout. When complete she will possess three decks—a main, promenade and an overhanging shade deck—in all affording accommodations for 600 passengers. The vessel is a single-screw steamer driven by fore and aft compound jet condensing engines with cylinders of 18 and 36 in. diameter and 24 in. stroke. Her dimensions are: Length, 104 ft.; beam of hull, 26 ft.; beam over guards, 33 ft.; draught, 10 ft.

A wooden barge of 2,000 tons capacity and worth about \$35,000 was launched by the Calvin Co., vessel owners and forwarders, at Garden Island, Ont., a few days ago. The vessel is 190 ft. long, 40 ft. beam and of 15 ft. draught.

Lake vessel owners are of course very much interested in the great strike of iron workers. A protracted struggle might have a very depressing effect upon the movement of iron ore and thus open up to the grain trade later on a large amount of vessel capacity that would otherwise be employed in moving ore. But aside from the unfavorable labor outlook, there is still every indication of a prosperous fall. Northwestern grain shippers have for a month past been offering 3 cents for vessels to move grain to Buffalo in October, and if labor difficulties were out of the way they would undoubtedly bid higher, as they have covered very little grain.

years ago there was nothing documented at Duluth but a few small steamers and tugs, scows and launches. A dispatch from that point to the Review says that the customs officials have just forwarded to Washington a report showing the following vessels documented on June 30, with a large part of the Steel Corporation fleet to be added during the present month:

Number of vessels.	Gross tons.
Sailing ships, iron.....	13 45,777
Sailing ships, wood.....	13 9,788
Barges, iron.....	23 30,826
Barges, wood	66 10,229
Steamers, iron	77 239,532
Steamers, wood.....	95 35,624
Total	287 371,776

DESIGN OF NEW ARMORED CRUISERS.

Members of the naval board of construction have begun the consideration of plans for the two armored cruisers authorized in the last naval act. The board has already agreed on the displacement, speed and coal capacities of the vessels. The design will call for ships of 14,000 tons displacement. The bunkers must hold 2,000 tons of coal, thus providing great steaming radius. The Brooklyn, the larger of the only two armored cruisers in the American navy in commission, has a maximum coal capacity of 1,600 tons, while the New York has only 1,150 tons. The idea of the board of construction is to provide vessels that can cover 7,000 to 10,000 miles without recoaling, thus insuring steady runs from the Atlantic or Pacific coast without recoaling. The speed has been fixed at 22 knots. In tonnage and general design the vessels will be practically similar to the armored cruisers California, Pennsylvania and West Virginia, now under construction.

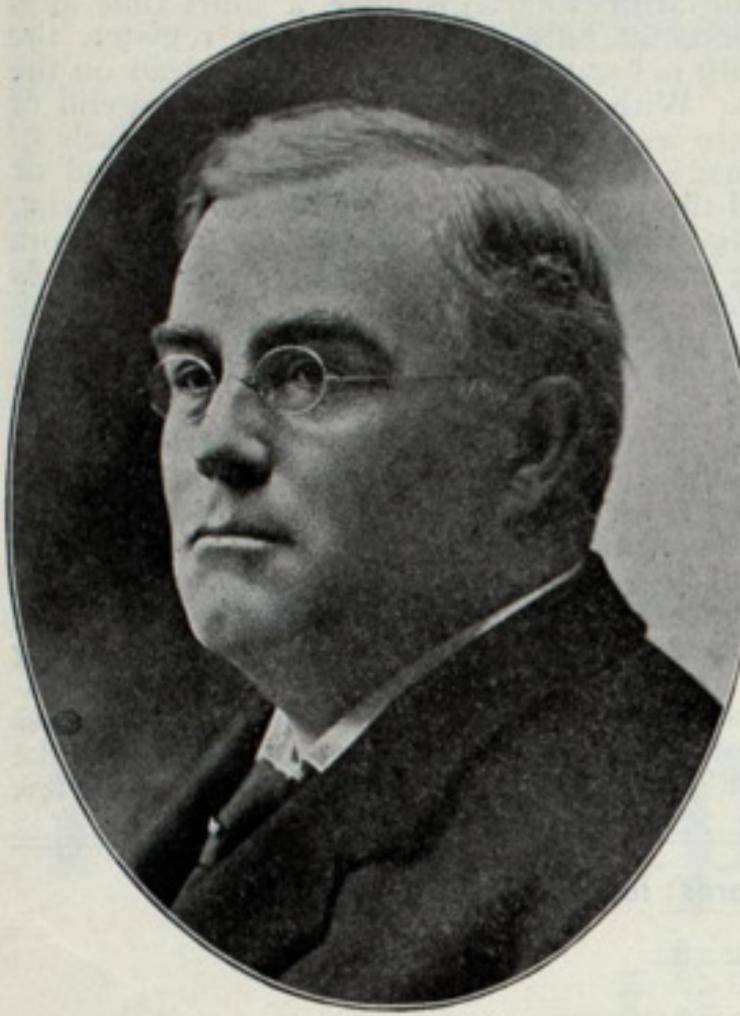
A meeting of the executive board of the Great Lakes Towing Co. was held in Cleveland, Wednesday, and it was decided to again begin the payment of regular quarterly dividends of 1¾ per cent. on the preferred stock. A dividend of 1¾ per cent. will be paid August 20. This means, very probably, that since competition has been removed the towing company has earned enough to provide a liberal working capital aside from the resumption of dividends.

THE WELLMAN-SEAVER ENGINEERING CO.

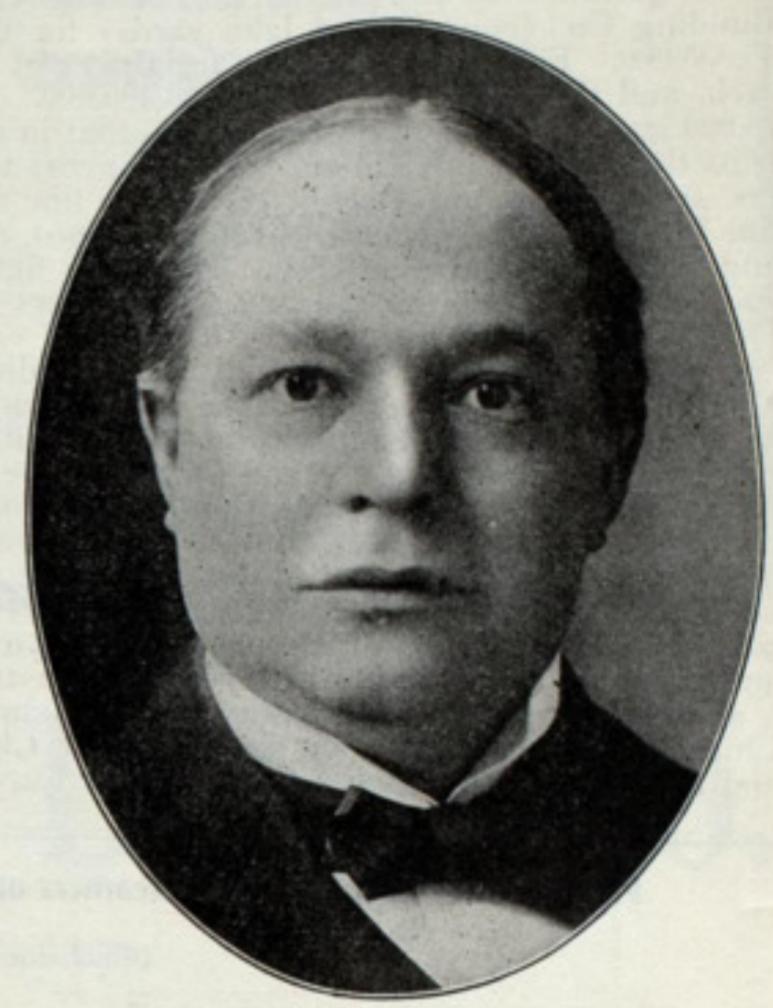
STORY OF ITS REMARKABLE SUCCESS SINCE ITS ORGANIZATION IN 1896—
IT WILL UNDERTAKE ANY ENGINEERING TASK WHATEVER—UNIQUE
IN ITS COMPREHENSIVE CHARACTER.

This story will have to be told in two chapters—the men and the company. The astounding thing about the Wellman-Seaver Engineering Co. of Cleveland is its phenomenal success. It is not merely a successful company, but a phenomenally successful one. Very few instances of industrial enterprise parallel it. Five years ago the engineering force of the Wellman-Seaver Engineering Co. consisted of Chief Engineer John McGeorge, a draughtsman and a small boy. The force occupied two rooms on the fourteenth floor of the New England building. Today the engineering force consists of 120 men, and not only is the entire fourteenth floor of the New England building occupied, but a considerable part of the thirteenth as well. In addition about 5,000 men are employed in various plants on their work. It is ready to undertake anything in the engineering line. There isn't any undertaking big enough to stagger it and there isn't anything so small as not to engage its attention. It will assume a \$5,000,000 contract

with the ease with which it assumes a \$5,000 one and it will give equal attention to both. It has so won the confidence of great industrial organizations during the past five years that it has upon its books contracts sufficient to keep it busy for the next two years if it did not get another stroke of work. That isn't saying, however, that it isn't looking for more. It has so comprehensive an equipment that its capacity to all practical purposes is unlimited, and it has so specialized, subdivided and concentrated its work that it can execute a contract of the greatest magnitude with the utmost rapidity. The world is its field. It is remodeling plants in Spain and it has under contract ma-



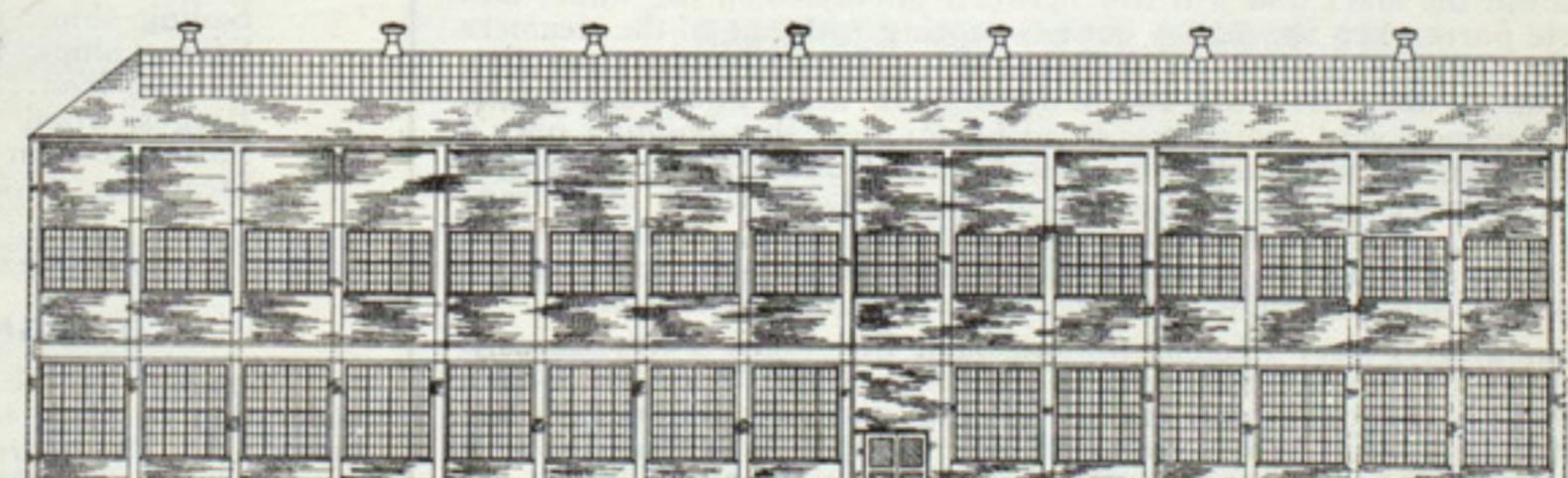
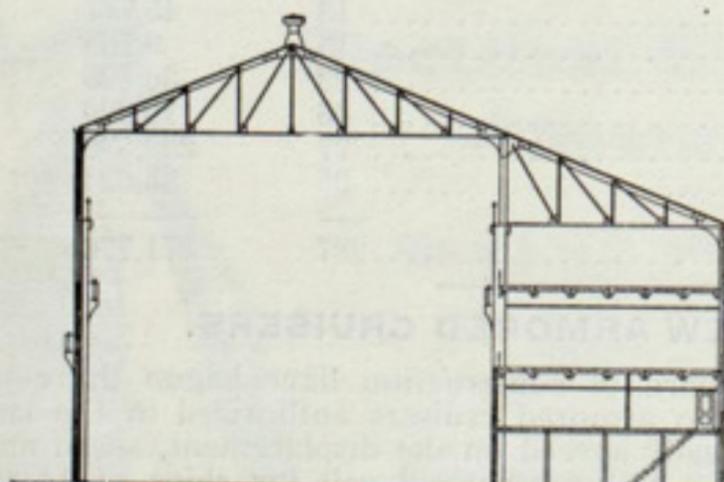
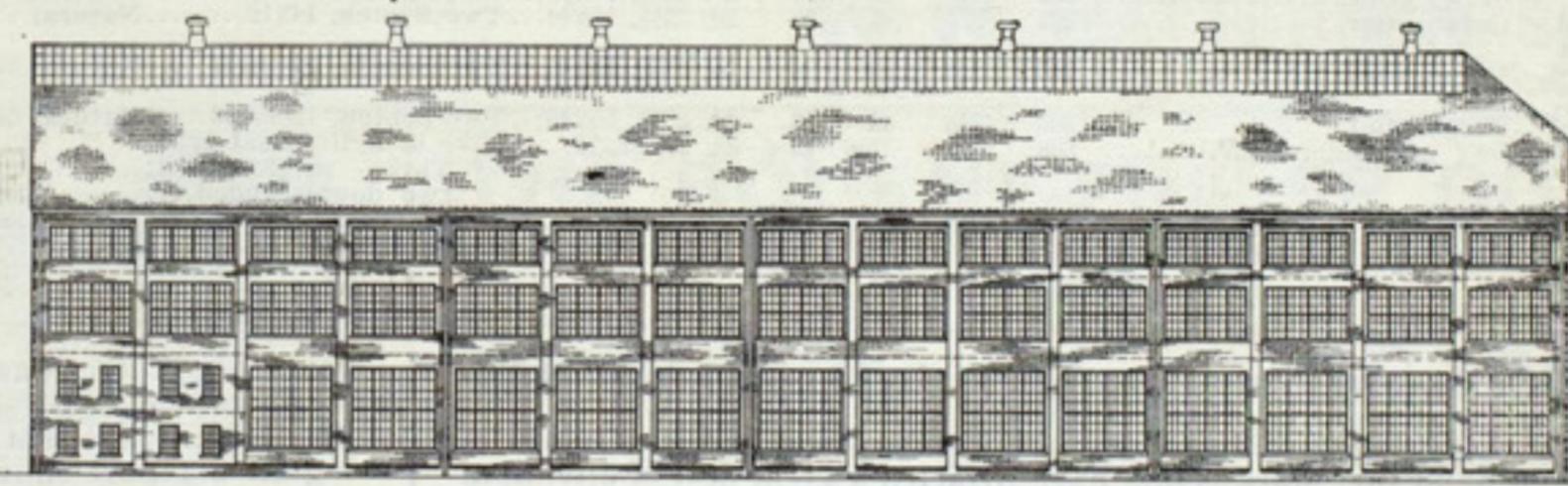
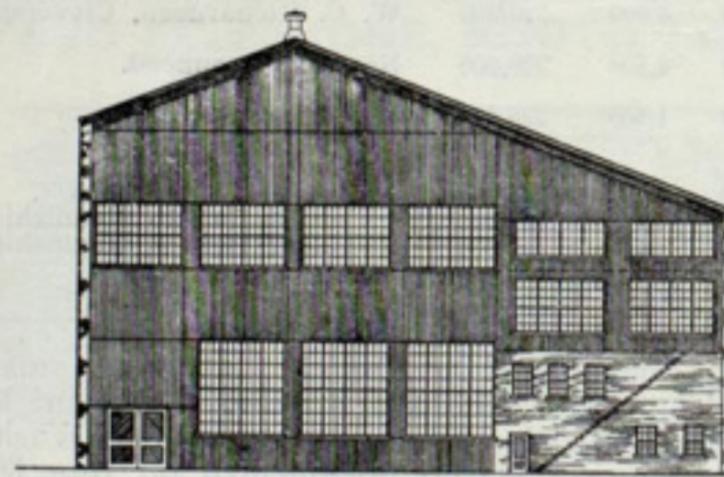
SAMUEL THOMAS WELLMAN.



JOHN WRIGHT SEAVER.

States. Wellman was glad to get the job. Later he entered the employ of the Bay State Iron Co. of Boston and built the first furnace, commercially considered, for melting steel on the open-hearth plan ever erected in the United States. He also invented a fore-hearth to tap directly from the furnace into the moulds, thus dispensing with the ordinary ladle. And then he went back to the Nashua Iron Works where his father was still superintendent. In 1873 he received a very flattering offer to join the Otis Steel Co. of Cleveland. He accepted. The Otis Steel Co. became one of the most successful of steel companies and its product the standard steel product of the United States. It was the usual thing for specifications throughout the country to contain the condition "Otis steel or its equal." In 1886 Mr. Wellman rebuilt one of the furnaces at the Otis plant, putting in a basic bottom, and made in this furnace the first basic steel ever made in the United States. The furnace ran for a few months when, for various reasons, it was discontinued. Mr. Wellman made the prediction at the time that the basic process would supersede eventually the Bessemer acid process and the trend of events today show with what accuracy he foresaw the future. Nearly all the stationary furnaces in the United States today are modeled from the open-hearth furnace of the Otis Steel Co. In 1890 Mr. Wellman became the consulting engineer of the Illinois Steel Co. In 1893 he took charge of the old Chester Rolling Mill Co., Chester, Pa., and undertook to do what neither man nor demi-god has ever successfully accomplished—to rehabilitate a decadent enterprise upon a declining market. After a struggle with a rebellious majority interest he gave it up. After this comes the present company and the joining of his energies with those of John Wright Seaver.

Mr. Seaver was born at Madison, Wis., in 1855 and comes from a line of ancestry on both his father and mother's side reaching back to the time of the pilgrims. One of his forebears, Major Seaver, was a



THE ELEVATION OF THE MACHINE SHOP, NOW BUILDING, FOR THE WELLMAN-SEAVER ENGINEERING CO.

chinery for the Imperial Steel Works of Japan. All this is merely the foreword to the story.

S. T. Wellman, who is the president of the American Society of Mechanical Engineers today, was four years old in 1851 when his father moved to Nashua, N. H., and entered the employ of the Nashua Iron Co., whose superintendent he was for twenty-seven years. The boy spent one year in the high school and one year in college, but the draughts of learning were mainly drank in the old Nashua Iron Co.'s works. While a very young man he built the first Siemens gas regenerating heating furnace ever built in the United States. When Siemens' engineers came over to this country to build the furnace according to the drawings previously furnished by them they were astonished to see that the work had already been done. Siemens was so delighted with Wellman's ability that he employed him in his furnace constructive work in the United

minute man and fought at Lexington. Mr. Seaver was educated in the public schools at Buffalo, N. Y., and at an early age entered the machine shop of the Shepherd Iron Works of that city. After a number of years of work of this character his attention was attracted to the structural iron business, then in its infancy, and in which he saw great opportunities for the future. With this in mind he became connected with the Kellogg Bridge Co. of Buffalo, in the capacity of assistant engineer, and remained with them for a number of years, afterwards removing to Pittsburgh to become engineer of the Iron City Bridge Co. After five years service with them he assumed the position of chief engineer of Riter & Conley of Pittsburgh, a concern at that time doing a moderate business in the construction of blast furnaces, steel work and general construction work. During the fifteen years of Mr. Seaver's connection with this company the business of the concern developed until it became one of the greatest in the world, and iron making became greatly enriched through several

valuable inventions which came out of Seaver's inquiring mind. Mr. Seaver has traveled extensively throughout this country and Europe and is looked upon as one of the most eminent structural engineers living. He is a member of several prominent engineering societies.

It is these daring and original minds that the Wellman-Seaver Engineering Co. has at its service. But the company is not alone Wellman and Seaver. The secret of the company's tremendous success lies in the comprehensive character of its personnel and the masterful front which it presents through its staff to every engineering problem of whatever conceivable character. S. T. Wellman, the president, is one of the biggest iron and steel men in the world; J. W. Seaver, the vice president, is a structural engineer of eminence; Charles H. Wellman, the general manager, is a prominent metallurgical engineer; Thomas R. Morgan, the secretary, is a specialist in crane engineering; while A. D. Hatfield, the treasurer, has an aptitude for financial detail of an unusual quality. This is the organization which in 1896 started in life with the assistance of a typewriter and an office boy and which in 1901 surveys the whole world as its market. The company is successful because there is nothing in the engineering line that it cannot do. The force of this should be permitted to sink in—there is absolutely nothing in an engineering line that the company cannot do. It not only designs but it builds as well. It will design a steel making furnace and build it; it will design a rolling mill and build it; it will design a bridge and build it; it will design an office building or a great machine shop and build it; it will design hoisting and conveying cranes and build them; anything of a structural character this company can furnish from the drawing to the finished product. Its success is therefore the outgrowth of its comprehensive character. It is unique among engineering companies in that it embraces all of them. Most engineering companies make one specialty only.

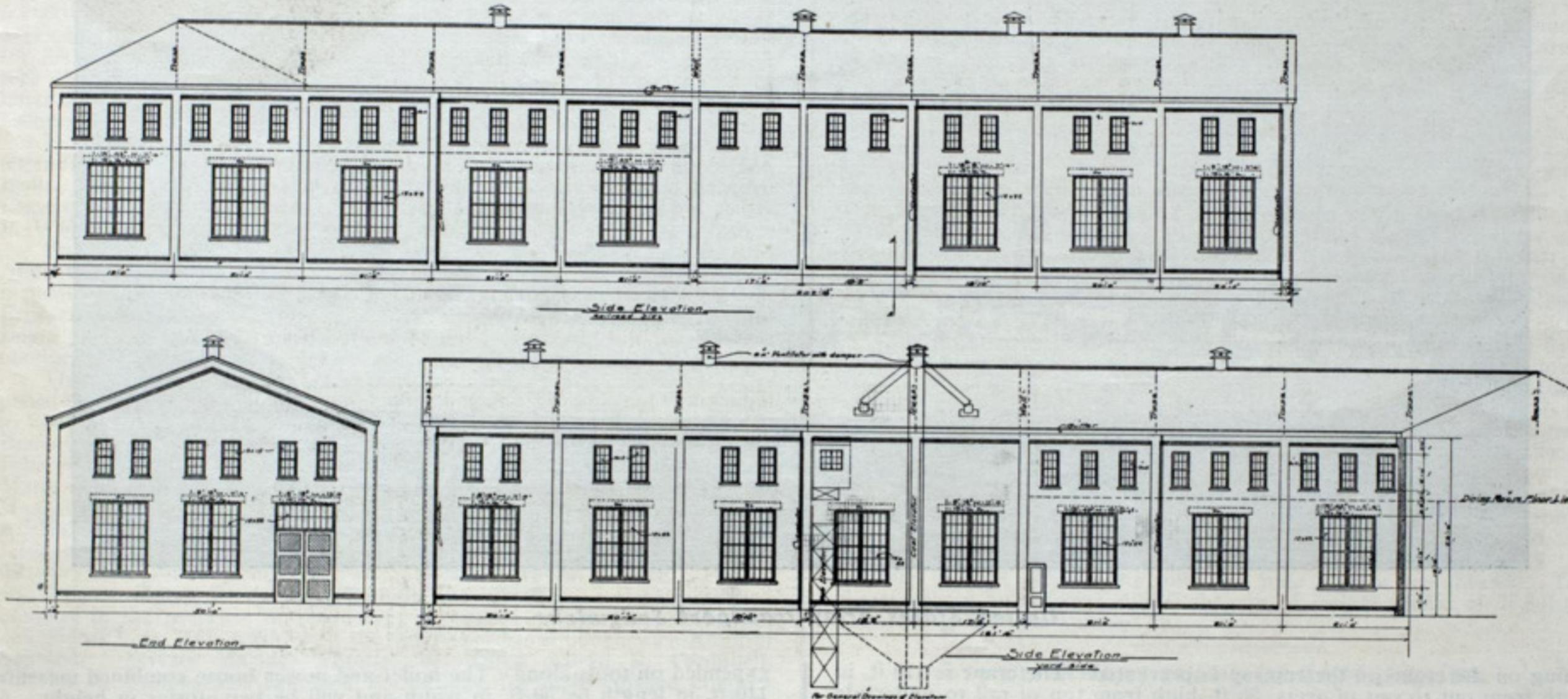
COMPANY'S DEPARTMENT ORGANIZATION.

It must not be thought for an instant, however, that because it is so wide sweeping it is not proficient in all. That is the inner secret of its success—the perfect mastery of its subject in all its phases. One has

is the best. It will see to it, too, that the contracts are properly executed. All the client has to do is to pay the bills—and he may depend upon it that he will pay no more than the article is strictly worth.

Now what does this remarkable company do? To begin with, it designs and builds complete steel works for the open-hearth and Bessemer processes and manufactures all the equipment of a modern steel plant. It also makes a specialty of rolling mills and is prepared to contract for complete rolling mill plants, including the mills, engines, tables, shears, hot beds, conveyors and cranes, and to turn them over in working order. Do you want an illustration? The company built the great open-hearth steel plant of the Tennessee Coal, Iron & Railroad Co. at Ensley, Ala., with its equipment of ten 50-ton open-hearth steel melting furnaces and rolling mills. It is building the steel mills of the Lake Superior Consolidated Co. at Sault Ste. Marie, Ont.—the great Clergue enterprises which are turning the Canadian wilderness into a workshop, a veritable forge in the forest as it were. It is rehabilitating and modernizing steel plants throughout the globe and has contracts under way in Europe and Japan. The company's work in the open-hearth furnace line has been very extensive and dates back to the time when Wellman built the first successful open-hearth furnace ever built in the United States for the old Bay State Iron Co. of Boston. Nearly all the stationary furnaces in the country are modeled upon Wellman's. The company has in its furnaces met successfully the requirements of fuel oil, natural gas and producer gas as fuel.

The first furnace in the world of 50 tons capacity was of the Wellman rolling melting type and it was built for the Illinois Steel Co. This company are the sole manufacturers of this furnace which is now being largely adopted as the leading type of steel melting furnace and has been constructed of capacities ranging from three tons to 100 tons per heat. The most modern and perfect type of these rolling furnaces are those installed by the company at the works of the Tennessee Coal, Iron & Railroad Co. A special feature of the rolling furnace is the fore-hearth—a kind of special ladle, attached to the front of the tapping hole and which enables the molten metal to be poured direct into the ingot molds. The advantage of this must not be understated—it permits a more direct trans-



POWER HOUSE AND BOILER SHOP, NOW BUILDING, FOR THE WELLMAN-SEAVIER ENGINEERING CO.

but to inspect its offices to see how this is accomplished. The preliminary ideas and sketches for work that may be required are first thoroughly studied and discussed by the officers of the company and then placed in the hands of the drafting department which is exceptionally well equipped and is one of the largest in the country. The drafting room is in charge of Chief Engineer John McGeorge and a staff of assistants, each of whom is in charge of a force of draftsmen constituting a sub-department. A further corps of assistants is assigned to the tracing and blue print department and by this means a large volume of work can be expeditiously handled. Every drawing, of high and low degree, is made the subject of careful supervision and checking and none are allowed to leave the office until absolute accuracy is assured. After the drawings are finished and checked, detail and general specifications are prepared and bills of material made up. The great advantage of the organization to parties desiring to take up the manufacture of different lines of work lies in the fact that it enables them to begin construction with complete and accurate drawings, bills of materials, estimates and specifications—all of which have been passed upon by those who have made a special study of that individual case. The company also maintains a thoroughly efficient corps of superintendents and inspectors who are prepared to take charge of the construction and erection of any work and also to supervise its construction in the shops. In other words no loop hole is left for error. It will watch with the eyes of a hawk the evolution of its product from the penciled sketch to the completed building—and it does not matter whether the site of the building is Sault Ste. Marie, Ont., or Nagasaki, Japan. A representative of the company is on the spot. The company also maintains a competent purchasing department. It has to, because it is a very large purchaser of machinery and material on its own account and it knows the various manufacturers and the capacity of their plants intimately. It will, upon request, turn this great operating department over to its client and will, after the completion of the designs, secure bids for construction, tabulate them carefully and recommend that which

fer of metal from the furnace to the molds than is possible with a separate ladle, and owing to the very brief passage of the steel through the air largely diminishes the loss of manganese which takes place in ordinary practice. The whole contents of a 50-ton furnace are poured into sixteen molds, containing about three tons each, in twelve minutes. The company is now building rolling melting furnaces for the Brymbo Steel Works, Ltd., Wrexham, England; Frodingham Iron & Steel Co., Frodingham, England; Northeastern Steel Works, Middlesbrough, England; Vickers Sons & Maxim, Sheffield, England; Washburn Wire Co., Phillipsdale, R. I.; Earl of Dudley's Round Oak Works, Dudley, England; and several others. The company are also the sole manufacturers of the Wellman patented open-hearth furnace-charging machines and charging boxes and have supplied them to all the leading steel works in America and to a number in Europe. These inventions are saving annually to the steel manufacturers of the United States over one million dollars.

The company are also in the United States the exclusive manufacturers of the Fraser-Talbot mechanical gas producer and also of the Forter patent water-sealed reversing valve for regenerative gas furnaces, heating furnaces, glass furnaces, open-hearth furnaces, crucible furnaces and soaking pits.

The company will also design and superintend the construction of buildings for manufacturing and office purposes. The machine shop of the American Ship Building Co. at Chicago was designed by this company and is a model in its line. The first point to attract attention is the large amount of light in the building. The greater part of the sides and all the lean-to roofs in the building are constructed of glass.

SHIP YARD CRANES—VARIOUS TYPES OF CRANES.

Besides building a general line of standard overhead traveling cranes the Wellman-Seaver company designs and constructs cranes for special requirements, such as gantry or leg cranes traveling on surface tracks,

cantilever cranes and special cranes for ship yards and other works. For ship yards there are two systems of crane service constructed under the Seaver patents which the company controls exclusively. In general the principles involved in the Seaver system are the placing in position of two or more high-speed electric traveling cranes over the ways in which each ship is to be built, each crane being entirely independent of the other. In the ordinary type of service where one gantry crane is used over one or two berths the use of the crane for work on one side of the ship necessarily suspends work on all other parts where the crane is required, thus making apparent the advantage of having more than one crane available. It is also apparent that there is a great waste of power in moving a heavy gantry crane to transport a light load only, and the Seaver system assumes the economy of using light, fast-running cranes designed only of sufficient capacity to carry a load of medium weight; in exceptional cases where it may be necessary to handle a load beyond the capacity of one crane, the lifting power of two cranes can be combined by an equalizing beam. The crane service of the Superior Ship Building Co., at West Superior, Wis., designed by this company, consists of an elevated steel track or runway extending the full length of the ship yard between two building berths, and mounted on this runway is a cantilever gantry crane which traverses the full length of the runway. By means of this arrangement the material is transferred from the end of the yard where it is delivered from the shops out to its place in the vessels with a very small amount of handling and at great saving of labor. A point of interest in the construction of the crane is the double runway between which the wheels of the crane travel and by means of which the over-

NEW WELLMAN-SEAVER PLANT.

To sum it all up the Wellman-Seaver company are general engineers—civil, mechanical, mining and electrical. So far the company has been without a plant for its own use, but recently purchased six acres of land on the line of the Cleveland & Pittsburgh Ry. at Giddings avenue, Cleveland, and is now engaged in erecting a plant. There is one purpose underlying the construction of the new works and that is to produce a plant which will stand as a model of its kind. The plant will challenge inspection. It will be a concrete evidence of what the company can do for itself and therefore of what it can do for others. Representatives come from all parts of the world to visit the company and they will not fail to be impressed with the compactness, economy and completeness of the plant. It will have no altruistic features but will be a practical working institution. The drawings which accompany this article shows the general style of the buildings. It will doubtless be the pleasure of the Review at a later date to publish interior and exterior photographs of the plant. The machine shop will be a four-story brick building, 600 ft. long by 128 ft. wide. The first floor will be 70 ft. in the clear and will be so constructed as to admit an abundance of light to all parts of the building. No shafting, belting, pillars or other obstructions will be employed. Every machine will be driven by an individual motor. The pattern shop will be 165 ft. in length by 50 ft. in width, four stories high, and will be one of the finest pattern shops in the country. Its equipment of wood working tools will be complete. Indeed the tool specifications for the entire plant are so elaborate that the tool makers to whom they were submitted expressed surprise and declared that they had never read specifications so excellent and so thoroughly modern. The sum of \$300,000 is being



United States army transport Sedgwick.

turning on the crane on the runway is prevented. The crane is 170 ft. in length from out to out of arms, 55 ft. high from top of rail to underside of crane, and has a lifting capacity of 15 tons half way out on the arms and 5 tons at the extreme end of the arms.

This company has been retained as consulting and constructing engineers in connection with some of the most important blast furnace constructions of the United States and Europe. It not only designs and superintends the construction of complete plants but makes a specialty of the designing and installation of the hoisting machinery for handling the stock. The Rombacher Huttenwerke, Rombach, Germany, was equipped with the Seaver blast furnace hoist designed by the company. The company is also the sole manufacturer of the Seaver electric coke unloader, designed to receive coke from the coking chambers of by-product coke ovens and load it into cars standing on adjoining tracks. The construction of this machine is such that it can traverse along the track in front of the coke ovens. The loading pan, after receiving the coke, can be lifted, first in a vertical direction and then out over the car into which the coke is to be loaded. The gates which form the front of the loading pan can then be opened and the coke dropped, without waste, directly from the pan into the car. The company also controls the Seaver patented coal elevator, designed for the rapid and economical handling of coal from vessels into storage pockets. It can also be arranged to handle other material of similar nature and the company is prepared to contract for the construction of complete coal handling plants, consisting of lifting and conveying machinery, storage pockets and weighing devices. It also constructs and installs cement manufacturing plants of the latest and most improved design. It recently designed a plant for the Iroquois Portland Cement Co., Caledonia, N. Y., now in process of construction.

There isn't anything that this company will not undertake. The Cleveland Electric Railway Co. recently wanted loaded coal cars transferred from the side track of a standard gauge railroad to the storage bins over the tops of the boilers in the boiler house. The company solved the problem by using a transfer table to convey the loaded coal cars from a side track to the elevator which raises the cars to tracks running over the coal storage bins and after dumping the coal lowers the empty cars to tracks in the cellar, running under the ash hoppers, permitting direct discharge into the cars, which can then be returned to the ground level.

expended on tools alone. The boiler and power house combined measure 110 ft. in length by 50 ft. in width and will be two stories in height. A large dining room will be located over the power house. The forge shop will be 50 by 60 ft. The Sturtevant system of heating and ventilating will be employed throughout the plant and the instructions to the contractors are to provide the best possible for the comfort of the men. The sanitary arrangements will be of the most perfect order. The entire plant will be lighted with the arc and incandescent systems of electric lighting. No expense will be spared to provide everything which contributes to the welfare of the workmen. The plant will be healthful, well lighted and cleanly. It will be ready for occupancy about Nov. 1, and will employ from 600 to 1,000 men.

This then is the Wellman-Seaver Engineering Co. which today maintains established offices in London and St. Petersburg and has resident representatives in Holland, France, Germany and Austria. Its subsidiary companies in Cleveland are the Electric Controller & Supply Co. and the Balkwill Pattern Works.

A WONDERFUL STORY.

A wonderful story comes from Philadelphia to the effect that Andrew Carnegie has become interested in a device for propelling steamships, invented by Lieut. James Weir Graydon, formerly of the United States navy, and that he is organizing a company with a capital of \$4,000,000 to apply it. It is understood that the invention is a compound steam turbine, bearing the same relation to the turbine invented by Charles A. Parsons at Glasgow that a simple engine does to a compound. Graydon's turbine, according to the Philadelphia story, uses steam under fifteen different pressures within a single cylinder the size of a nail keg, and the model exhibited generates 25 H. P. and makes 3,000 revolutions a minute almost without vibration. It is announced, furthermore, and with great emphasis, that the turbine uses about one-third the amount of steam required to run an ordinary engine. The story says that with this new power steamships can cross the ocean in three days.

Benedict Crowell, of the firm of Crowell & Peck, mining engineers and chemists, Cleveland, is examining iron ore properties on the Mesabi and Vermillion ranges.

LIST OF OFFICERS REWARDED FOR BRAVERY.

The navy department has issued a general order publishing a list of officers and men to whom commendatory letters have been written by the secretary of the navy and also a list of those to whom medals of honor have been awarded. The following officers and men have received commendatory letters: First Lieut. J. L. Latimer, U. S. N., for gallant conduct at Pekin. Seaman Emil Sjogreen, specially mentioned, and the following men of the Marine Corps, for service with the legation guard at Pekin: Sergts. Frank B. Taylor, Alexander J. Foley, Harmon C. Skinner and Patrick C. Sullivan; Corporals Arthur Kennedy, Joseph Rogers and J. F. Abdill; Privates Charles Fields, George E. McCoy, Adrian Curet, Walter A. Greenleaf, Henry Gardiner and Julius Sandanander.

These men received letters for conspicuous conduct in battle near Tientsin on June 21, 1900: Naval Cadet C. A. Woodward, for running hawser around stern post of *Saturnis* under heavy fire in harbor of San Fernando, Aug. 2, 1899; Naval Cadets J. W. L. Clement and A. F. H. Yates, for conduct off coast of Samar, June and July, 1900; Seamen E. M. Svensson and Daniel Donoghue and Boatswain's Mate Oscar Huittfeldt, for bravery in attempt to save life of drowning man in Manila bay, Aug. 5, 1900; Ensign W. H. Standley and Quartermaster John Lysaght, for their conduct in a reconnoitering expedition at Balar, P. I., April 11, 1899; Lieut.-Col. George F. Elliott, marine corps, and his force, for conduct in an engagement at Noveletti, Oct. 17, 1899; Assistant Surgeon Carey D. Langhorne, for conduct in the presence of the enemy at Noveletti, on Oct. 8, 1899; Naval Cadet H. L. Brinser, for his conduct in the presence of the enemy in Subig bay, Sept. 23, 1899; Ensign H. C. Mustin, for special efficiency at the capture of Vigan and for swimming through surf twice in order to get messages to and from Gen. Young at St. Thomas, Luzon, in December, 1899; Lieut. E. L. Bisset and Clerk E. P. M. Damm of the navy for their conduct on a trip from Sibutu island to Jolo in September of 1899; Coal Passer Albert H. Ryan for jumping overboard from the *Manila* in June, 1900, to assist a liberty man. Ensign O. S. Kneiper, for conspicuous conduct in the engagement at Ajui, Pana, and at the capture of Romblon, December, 1899; Ensign G. T. Pettingill, for skill, courage and efficiency at Tientsin in June, 1900; Ensign W. C. Davidson, for conduct in handling gunboat Paragua while under fire and for his conspicuous conduct at the engagement at Ajui and at the capture of Romblon, and Ensign A. H. McCarthy, a highly commendatory letter for his skill, courage and good judgment in handling the gunboat Calamanes in the Agusan river, Mindanao, Feb. 26, 1901.

Each of the following privates in the marine corps has received a letter for his work in assisting in barricades at Manila, July and August, 1900: John Butts, Charles B. Hobbs, Herman Kerm, Fred B. Moody, Christopher C. Mullin, Martin L. Mueller, Richard Quinn and Charles R. White.

For their conduct in the presence of the enemy at Pekin, in July and August, 1900, these privates from the marine corps have received commendatory letters: John A. Mann, Robert M. Babbett, Gottlieb Brosi, Edward J. Donovan, Henry C. Gallagher, Harry Gold, Thomas F. Hall, James J. Lavin, Jacob C. E. Martin and Fred J. Tinkler. For meritorious conduct in Samoa in 1899, Passed Assistant Surgeon G. A. Lung.

The following have been awarded medals of honor: Daniel Daly, private, marines, for distinguished conduct in the presence of the enemy in battle at Pekin, Aug. 14, 1900; Chief Boatswain's Mate Joseph Clancey, Boatswain's Mates Edward Allen and William E. Holycote; Coxswains John McClery, Jay Williams, Francis Ryan and Karl Thomas; Gunner's Mates John P. Chatham and Martin T. Torgerson; Machinist Burke Hanford, Chief Carpenter's Mate William F. Hamberger, Seamen Hans A. Hansen, and George Rose, Ordinary Seaman William H. Seach, Landsmen James Smith and Joseph Killecky and Oiler Frank E. Smith of the navy, and Gunnery Sergeant Peter Stewart, Corporal Reuben J. Philips and Private Harry W. Orendorff of the marine corps, for distinguished conduct in the presence of the enemy in battles on the 13th, 20th, 21st and 22d of June, 1900, while with the relief expedition under Vice-Admiral Seymour. Private Marines Thomas W. Kates, Alfred R. Campbell, Charles R. Francis and Clarence F. Mathias, for distinguished conduct in the presence of the enemy in the advance on Tientsin, June 21, 1900; Private Marine James Cooney, for distinguished conduct in the battle of July 13, 1900, at Tientsin; Sergts. John M. Adams and Alexander J. Foley and Corporal Harry C. Adriance of marine corps, for distinguished conduct in the presence of the enemy in battle near Tientsin, July 13, 1900; Sergeant of Marines Clarence E. Sutton, for distinguished conduct in the presence of the enemy assisting to carry a wounded officer from the field under heavy fire at the battle of Tientsin, July 13, 1900; Gunner's Mate Joseph S. Mitchell, for distinguished conduct in the presence of the enemy in battle of Pekin, July 12, 1900; Hospital Apprentice Robert Stanley, for distinguished conduct in the presence of the enemy in volunteering to carry messages under fire at Pekin, July 12, 1900; Gunner's Mate Andrew V. Stoltenberg, Apprentice William H. Jaeger and Seaman Andrew P. Forbeck, for distinguished conduct in the presence of the enemy in battle, July 16, 1900, in Samara, Philippine islands; Corporal Thomas F. Prendergast, Privates Howard M. Buckley and Joseph Melvin of the marine corps, for distinguished conduct in the presence of the enemy in battle with the eighth army corps on the 25th, 27th and 29th of March, and the 4th of April, 1899; Sergeant Hardy Harvey, marine corps, for distinguished conduct in the presence of the enemy at Benictican, Feb. 16, 1900; Sergts. Michael J. McNally and Bruno A. Forsterer. Private Henry L. Hulbert and Gunner's Mate Frederick T. Fisher, for distinguished conduct in the presence of the enemy in Samoa, April 1, 1899.

For distinguished conduct at the battle of Pekin, June 20 to July 16, 1900, Sergt. E. A. Walker, Corporal John O. Dahlgren and Privates Martin Hunt and F. A. Young of marine corps; Privates Erwin J. Boydston, William C. Portner, Albert Moore, Herbert I. Preston, David J. Scanell and Oscar Upham of marine corps, for distinguished conduct in the presence of the enemy in erecting barricades under heavy fire, July 21 to Aug. 17, 1900. A medal of honor is also to be sent to the heirs of Private of Marines Fisher, who was killed while participating in the work of the marines just mentioned.

Drummer John A. Murphy and Privates William I. Carr, Henry W. Davis, Louis R. Gaienne and William Zion of the marine corps, for distinguished conduct at Pekin, July 21 to Aug. 17, 1900. For distinguished

conduct in the presence of the enemy at Pekin, June 28 to Aug. 17, Chief Machinist Carl E. Peterson and Seaman Axel Westermark of the navy and Private of Marines France Silva.

The order also says that Capts. Charles G. Long, B. H. Fuller and Philip M. Bannon and First Lieuts. John F. McGill and Robert F. Wynne of the marine corps, with the men under their respective commands, merit and receive the commendation of the department for their gallant, meritorious and courageous conduct in the battle of Tientsin, July 13, 1900.

MORE PROSPEROUS CONDITION OF RAILWAYS.

The thirteenth statistical report of the interstate commerce commission, dealing with the railways of the United States for the year ended June 30, 1900, has just been issued. Its leading figures are of interest as showing the general prosperity of the country as reflected by the railroads. The number of railways in hands of receivers on June 30, 1900, was fifty-two, there being a net decrease of nineteen as compared with the corresponding date of the previous year. The number of railways placed in the hands of receivers during the year was sixteen and the number removed from their management was thirty-five. The operated mileage of the roads under receivers on June 30, 1900, was 4,177.91, of which 3,640.32 miles were owned by them. The capital stock represented by railways under receivership on June 30, 1900, was \$108,096,855, funded debt \$107,393,022, and current liabilities \$35,531,620. These figures show a decrease in capital stock represented, as compared with the previous year, of \$112,113,833, and in funded debt of \$109,093,718.

On June 30, 1900, the total single track mileage of 2,023 railways in the United States was 193,345.78 miles, an increase during the year of 4,051.12 miles. This is a greater increase than that of any other year since 1893. The aggregate length of railway mileage, including tracks of all kinds, was 259,788.07 miles.

It takes 1,017,653 men to operate the railways of the United States, an increase of 88,729 during the fiscal year. The average is 529 employees per 100 miles of line.

There were 37,663 locomotives in the service of the railways on June 30, 1900, or 960 more than the year previous. Of the total number reported 9,863 are classed as passenger locomotives, 21,596 as freight locomotives, 5,621 as switching locomotives, and 583 are not classified. The total number of cars of all classes (not private cars) in the service of the railways on the same date was 1,450,838, an increase of 74,922.

The amount of railway capital outstanding on the date of the report was \$11,491,034,960. This amount assigned to a mileage basis represents a capitalization of \$61,490 per mile of line. Of this amount \$5,845,579,593 existed in the form of stock, of which \$4,522,291,838 was common stock and \$1,323,287,755 preferred stock. The amount which existed in the form of funded debt was \$5,645,455,367. This amount was classified as mortgage bonds, \$4,900,626,823; miscellaneous obligations, \$464,983,341; income bonds, \$219,536,883; and equipment trust obligations, \$60,308,320. The amount of current liabilities not included in the foregoing capital statement was \$594,787,870, or \$3,183 per mile of line.

The number of passengers carried during the year, as shown by the annual reports of railways, was 576,865,230, showing an increase for the year of 53,688,722. The number of passengers carried one mile—that is, passenger mileage—was 16,039,007,217, there being an increase in this item of 1,447,679,604. There was an increase in the density of passenger traffic, as the number of passengers carried one mile per mile of line in 1900 was 83,295, and in 1899 77,821.

The number of tons of freight carried during the year was 1,101,680,298, an increase of 141,916,655 being shown. The number of tons of freight carried one mile—that is, ton mileage—was 141,599,157,270. The increase in the number of tons carried one mile was 17,931,900,117. The number of tons carried one mile per mile of line was 735,366. These figures show an increase in the density of freight traffic of 75,801 tons carried one mile per mile of line.

PRELIMINARY PLANS OF BATTLESHIPS.

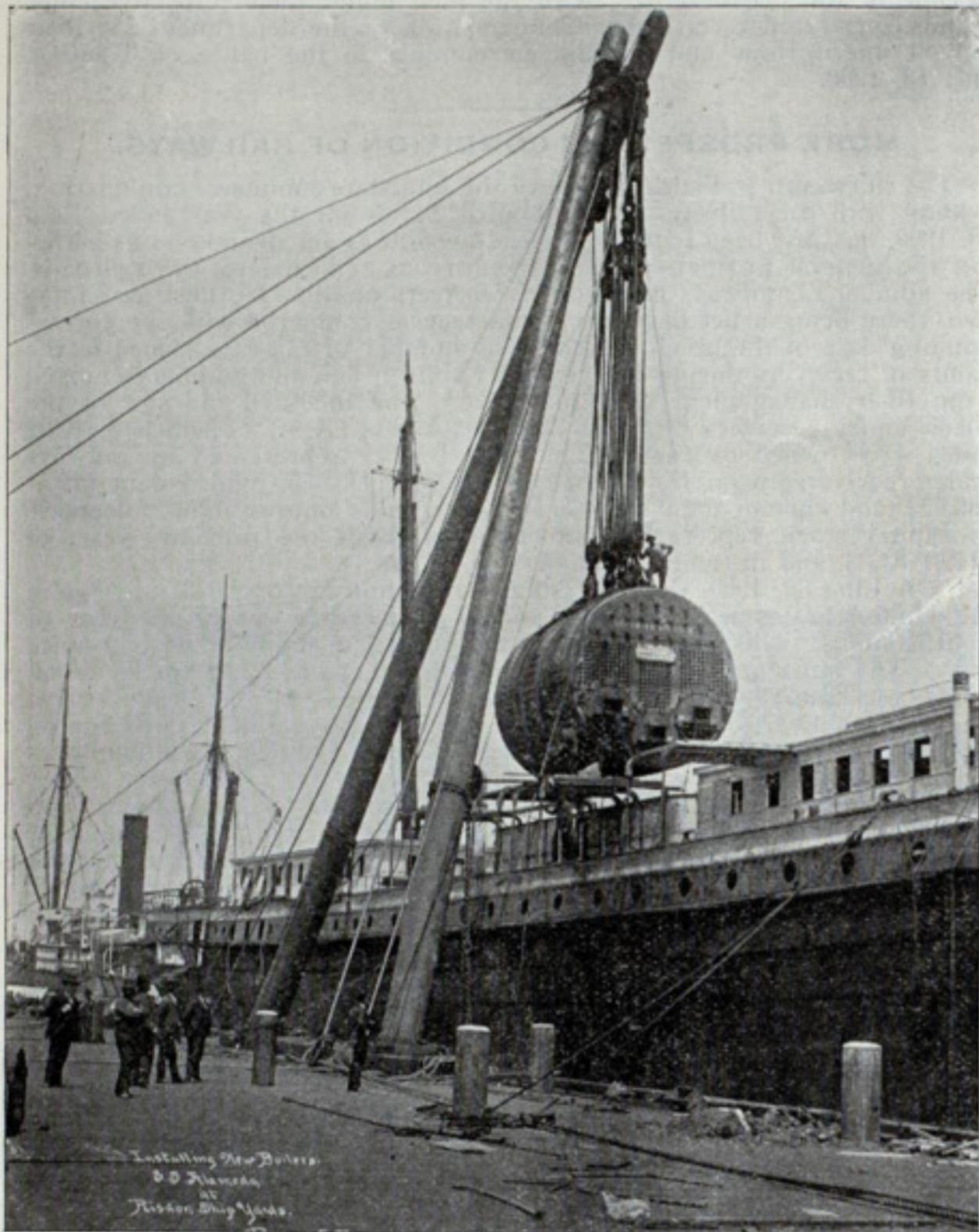
Secretary Long has given out the majority report of the naval board of construction on the design of the two battleships authorized by the last naval act. The report is merely preliminary, as the disposition of armament has not yet been agreed upon. The plans of the battleship as submitted are as follows: Length 450 ft., beam 76 ft., mean draught, 24 ft. 6 in., displacement 15,560 tons. This displacement will give a ship considerably larger than anything in the present navy. The hull alone will weigh about 7,000 tons, while the protective armor will be about 3,700 tons. The total coal capacity will be about 2,000 tons; total load displacement 16,900 tons; deep load draught of 26 ft. 4 in.; 19 knots speed, and an indicated horse power of 20,000. The battery recommended by the majority is to consist of four 12-in. guns in two 10-in. armored turrets, twenty 7-in. guns in casemates and twenty 3-in. guns. Each of the 7-in. guns is inclosed in individual armor. The 12-in. guns are located on the gun deck, in a central casemate battery. The machinery is protected by a 10-in. armor belt, tapering to 4 in. fore-and-aft beyond the machinery space, and the other protection consists of armor 7 and 6 in. thick except on the 12-in. turrets, where it is 10 in. thick.

DIVISION ON THE SUBJECT OF ARMAMENT.

The majority and minority reports of the naval board of construction on the question of the batteries of the two battleships for which plans are to be submitted to congress have been laid before the secretary of the navy. Rear Admirals O'Neil, Melville and Bowles signed the majority report. They want the main battery to consist of four 12-in. rifles, arranged in two ordinary turrets, one forward and the other aft, and broadsides of 7-in. guns behind the armored sides of the vessel. A number of 3-in. guns are provided for also. Rear-Admiral Bradford and Capt. Sigsbee, who signed the minority report, recommend the superposed turret, which they say has given satisfaction and enables a ship to give a better account of herself in action than ships with ordinary turrets. They want two superposed turrets, one forward and the other aft, each containing two 12-in. and two 8-in. rifles, or eight in all; two waist turrets of the ordinary type, each containing two 8-in. rifles, and broadsides of 6-in. rapid-fire rifles.

THE RISDON IRON WORKS OF SAN FRANCISCO.

Plans were made some time ago for extensive improvements at the Risdon Iron Works, San Francisco, and for the construction of new vessels on quite a large scale, but it would seem that the plant has for



PUTTING NEW BOILERS ABOARD THE ALAMEDA AT THE RISDON IRON WORKS, SAN FRANCISCO.

several months been kept so busy on a great variety of ship repairs that the contemplated enlargement could not be made to advantage. A photograph on this page shows the Sonoma, Australia and Alameda of the Oceanic Steamship Co.'s fleet, and the sailing ship Willie Rickmers at the Risdon works for repairs. The wharf shown in the photograph is not

Steamship Co.'s Mariposa will be overhauled and refitted in great part. The Willie Rickmers is having twelve new steel yards, six wooden ones, and new top masts put in, as well as other repairs to decks, houses and bowsprit. In fact it is estimated that since Feb. 1 the Risdon Iron Works has made repairs to transports and other vessels which are equal to the building of two new vessels.

When the plant of the Risdon Iron Works is complete it will be modern in every respect and well adapted to every kind of ship and engine building. The midship section is printed on the next page of a steam trawler which the company is building and which is about 25 per cent. completed. Dimensions of the trawler are: Length, 138 ft.; beam, 24 ft.; depth, 14 ft. 6 in. The company employs at present about 600 men. It is at the Risdon works that Robert Curr, formerly of the great lakes, is now located.

GENERAL RESUMPTION OF WORK AT NEWPORT NEWS

[Special correspondence to the Marine Review.]

Newport News, Va., July 17.—The striking machinists returned to work at the ship yard of the Newport News company Monday morning, after being out just six weeks, and operations were resumed in all of the departments in consequence. When the machinists struck June 4 for a shorter day and increased wages, over 7,000 men were employed in the yard. The strike necessarily interfered with work in other departments and from day to day men in other trades were laid off, until finally the number reached 4,000. The 3,000 left consisted of the foremen, clerks, draftsmen and the most skilled men in each department, in addition to the repair force, which was kept at work on the monster North German Lloyd liner Main, which is being rebuilt in dry dock No. 1. Work had to be discontinued on the battleship Missouri, the monitor Arkansas and some of the merchant vessels building. The yard is not working its full force yet and will not for a week or two, as many of the men laid off, as well as some of the strikers, left the city temporarily and all of them have not returned. They are coming back every day, however, and by Aug. 1 it is probable that the pay roll will show 7,000 men again at work. On account of the time lost by the strike, work in every department will be pushed and the company will endeavor to make up for lost time on its contracts. It will not be surprising if the force numbers 8,000 or 9,000 men at the close of the year, as it was being gradually increased when the strike interfered.

The battleship Illinois will be ready to go in commission about the second week in August. Only the finishing touches, such as polishing and cleaning, remain to be done. Capt. G. A. Converse, who will command the ship, has been serving on the torpedo boat board recently, but he will arrive shortly to be on hand when the flag is raised. Admiral Dewey visited the ship yard last Saturday and after inspecting the Illinois from stem to stern and from fighting-top to keel, almost, declared her to be the finest war ship ever built in the world, being particularly pleased with the attention which was paid to detail in her construction.

The Morgan line steamship El Dia will soon be ready for her builder's trial. It will not be many weeks now before the monster Pacific Mail Leviathan Korea will be ready to start on her long journey to the Pacific for service between San Francisco and Hong Kong. Her sister-ship, the Siberia, is nearly ready to launch. Other merchant ships on the ways are El Libre and El Siglo, for the Morgan line, which are not far from launching. On all of these ships work has been resumed, as it has on the Missouri, which is the only warship on the ways. There is more activity aboard the Arkansas, too, and she will be the next warship to leave the yard. Within the next few months keels will be laid for four more warships—the battleship Virginia, the armored cruisers Maryland and West



THE SONOMA, AUSTRALIA AND ALAMEDA OF THE OCEANIC STEAMSHIP CO.'S FLEET AT THE RISDON IRON WORKS, SAN FRANCISCO, FOR REPAIRS.

yet complete. It will extend to the ship yard and will be capable of mooring twelve vessels without inconvenience. The steamship Alameda of the Oceanic Steamship Co.'s fleet is having a thorough overhauling. New engines and boilers will be put in to give her a speed of 16 knots. The wooden decks and cabins have also been torn out and all the steel examined and renewed where necessary. The upper strake has been doubled and new 15-in. air ports put in, making the vessel first class in every particular. As soon as the Alameda leaves the yard the Oceanic

Virginia, and the protected cruiser Charleston. There are two vacant ways now and keels will go down on these very soon. It is probable that another steel electric cantilever crane for ship building will be erected before the close of the year.

The tug S. C. Schenck, now located at Marquette, Mich., has been fitted out with wrecking pump and hawsers and is now ready to go to vessels in distress in the vicinity of Keweenaw point on short notice.

BRITISH CRUISER LEVIATHAN—A FAST FIGHTING SHIP

Glasgow, Scotland, July 6.—Special interest is attached here to the launch a few days ago, from the yard of John Brown & Co., Ltd., Clydebank (builders of the Haverford) of the "mighty" first class cruiser Leviathan for the British navy. The famous Clydebank yard has never turned out a more notable vessel, for she is one of a new type of the fastest fighting ships in the world. Her length is 500 ft. between perpendiculars, or 530 ft. over all, her breadth is 71 ft. 3 in., her displacement 14,160 tons, her indicated horse-power 30,000, and her speed 23 knots. She is built throughout of Siemens-Martin steel of a special quality of exceptional strength. Two of her three decks are heavily armored. She has a water-tight inner bottom for her whole length, including water-tight magazines, store rooms, etc. She is divided into a large number of water-tight sub-divisions by transverse bulkheads. Her model is exceptionally fine for a war ship (which is not always "a thing of beauty," and which is, unfortunately, by no means "a joy forever," since warships nowadays very soon get out of fashion), and her stem is curved above the water line to form a ram. For this purpose it is heavily cast and is backed up by the armored decks and by the shell and armor plating. The stern post also is an exceptionally heavy casting and the helm is of unusual size to facilitate rapid maneuvering of the ship.

There are two sets of propelling engines of the inverted direct-acting triple expansion type, each with four cylinders working on separate cranks—the high pressure $43\frac{1}{2}$ in., the intermediate 71 in., and the two low pressure each $81\frac{1}{2}$ in., with 48 in. stroke. At a steam pressure of 250 lbs. and 120 revolutions per minute, the collective indicated horse power will be 30,000. The crank shafts are of forged steel and in two interchangeable parts. The steam distributing valves for the high and intermediate cylinders are of the piston type, and those for the low pressure cylinders are of the double-ported flat type, with large relief rings on the back. Each engine has two air pumps, and in each engine room are two hand pumps capable of being driven by the main engine. Four main condensers have a cooling surface each of 8,003 sq. ft. and two auxiliary condensers have a cooling surface of 1,726 sq. ft. each. In connection with the main condensers are four centrifugal circulating pumps with a combined capacity of 7,200 per hour, and the auxiliary condensers have an independent set of pumps. There are two electric light engines and dynamos, two reversing engines, two turning engines, two steering engines, two hot well pumps, four fire and bilge pumps, two sets of evaporators, distillers and pumps, and two ventilating fans and engines, all in the engine room. Forward of the engine room are four water-tight boiler rooms, two of them with twelve boilers each, one with eleven, and one with one. These boilers are of the latest Belleville water tube type, fitted with economizers. Of the forty-three boilers, five have ten generator and eight economizer elements, twenty-eight have nine generator and seven economizer, and ten have eight generator and six economizer elements. Each generator element has seven, and each economizer element nine pairs of tubes. All the tubes are of solid drawn mild steel, the large tubes $4\frac{1}{2}$ in. external diameter, and the small ones $2\frac{3}{4}$ in. The total heating surface in the boilers and economizers is 72,000 sq. ft., and the grate surface is 2,323 sq. ft. The working steam pressure of the boilers is 300 lbs. per square inch, reduced at the engines to 250 lbs. There are in the boiler rooms eight Weir feed pumps, six air blowing engines for the furnaces, sixteen fans with independent engines, eight double-cylinder ash hoists, and one drain tank pump. In addition to all this machinery in the engine and boiler rooms there will be two electric light engines and dynamos, four electrically-driven fans, two coal hoists, two boat hoists, one refrigerator, one workshop engine, and two sets of air compressors and reservoirs. All the steam pipes are of solid drawn or lap-welded steel, and there will be four funnels fore-and-aft, placed at a height of about 90 ft. above the fire grate.

The armament is of less interest to the readers of this journal than the mechanical features, but it may be noted in a few words. There will be two 9.2-in. guns mounted at each end of the ship and well protected. Sixteen 6-in. guns will be mounted on the broadsides, so that four can fire directly ahead and four astern without interfering with the range of the others, and there will be a large number of smaller guns placed throughout the ship. The armor belt extends from the stern to near the stem, and all the guns have armored protection. There is a conning tower of great thickness, but so placed as not to be observable, even at a short distance. All armor as well as the ship and engines are the production of John Brown & Co., Ltd. The launch of this formidable vessel was successfully effected with a considerable portion of her side armor already on.

The Leviathan and her boilers were too far advanced to be altered when the boiler committee, appointed by the government, recommended that no more Belleville boilers be fitted into ships for the navy. Meanwhile, however, the committee has instituted, as already noted in these columns, a direct trial between the Belleville boilers and cylindrical boilers in the cruisers Hyacinth and Minerva, now on a trial run to Gibraltar and return. This test will very probably demonstrate the relative coal consumption of the two types of boilers as well as several other points on which difference of opinion exists. The gunboat Shelldrake is about to leave Portsmouth on a similar voyage to subject her Babcock & Wilcox boilers to a searching test.

From the Buffalo Forge Co., Buffalo, N. Y., comes an illustrated catalogue about its engine. The company's engine is built in several types. Each is suited to a specific kind of work and very naturally possess the individual characteristics which adapt it thereto. Limitations of floor spaces and heights, together with different engineering practice in central power plants, aboard ship, etc., all call for appropriate engines forms. These sundry conditions are fully met and the various designs evince a careful consideration of all the requirements. The plant of the company has been greatly enlarged during the past year and equipped with the latest improved tools.

NOTES FROM SEABOARD SHIP YARDS

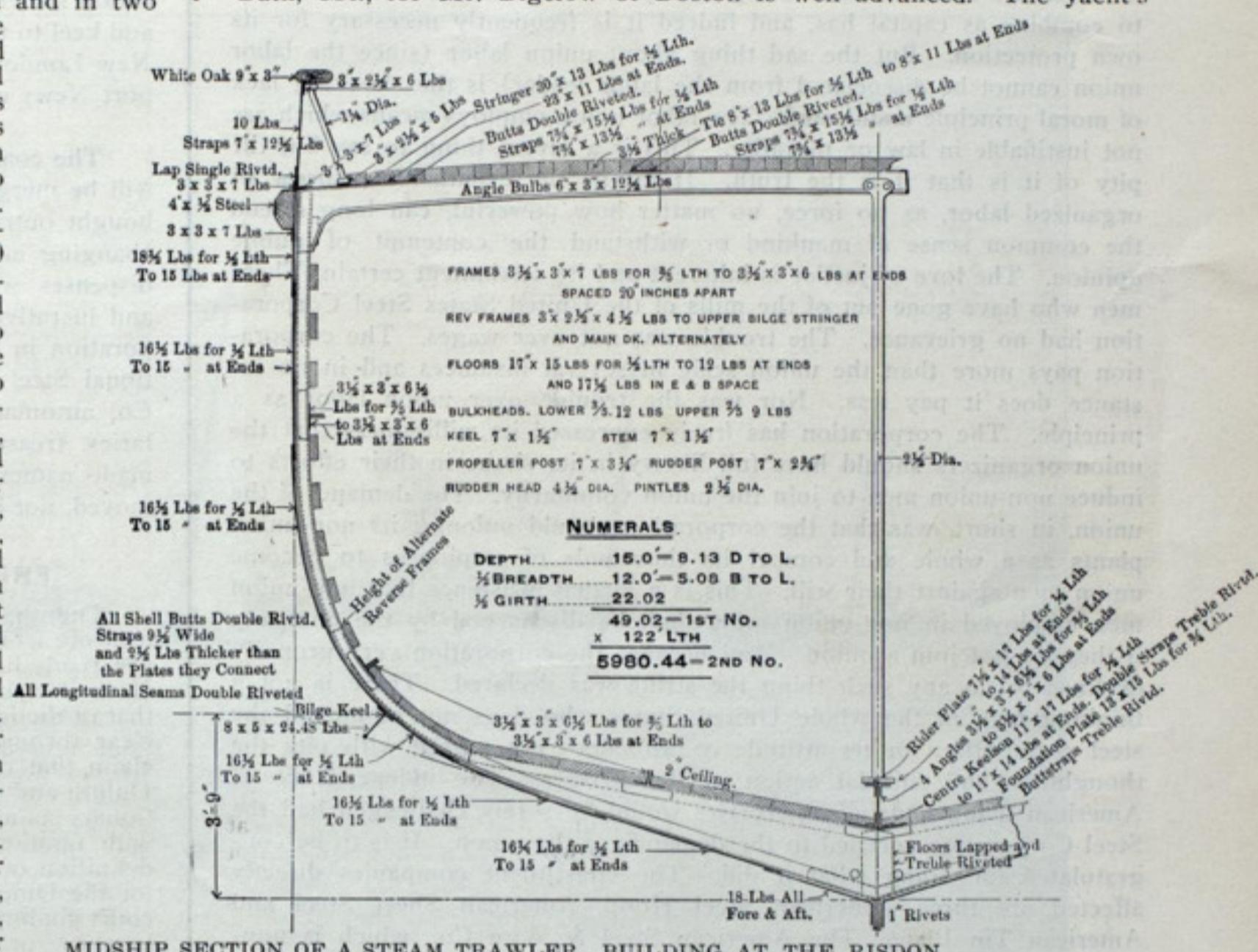
James W. Guffey and associates have purchased the steel steamer M. S. Dollar, which is under construction at the works of the New York Ship Building Co., Camden, N. J., from Robert Dollar & Son of San Francisco. The vessel will be used in the oil trade. Mr. Guffey has also given a contract to the Neafie & Levy Ship & Engine Building Co., Philadelphia, for two steel bulk-oil steamships of 800,000 gallons capacity.

Max Paschwitz, an attache of the German embassy at Washington, and Rudolph Ladiner, instructor of construction in the German navy, visited the ship yard of the Harlan & Hollingsworth Co., Wilmington, Del., last week upon the request of the German emperor. The emperor owns a yacht which was built by this company for Chester W. Chapin of New York and the visit had to do with another prospective order.

Stockholders of the East Boston Dry Dock Co. have voted to lease the property to the Atlantic Works, East Boston. This gives the Atlantic Works a considerable water frontage. The management of all the affairs of the dry dock company has virtually passed into the hands of the Atlantic Works.

The Cramps of Philadelphia are now lengthening the Comanche of the Clyde line 50 ft. The vessel is 320 ft. long and 40 ft. beam and when built by the Cramps three years ago was the finest vessel in the service of the Clyde line. It is expected to have the work completed within two months.

Preliminary work on the steel yacht building at the Bath Iron Works, Bath, Me., for Mr. Bigelow of Boston is well advanced. The yacht's



MIDSHIP SECTION OF A STEAM TRAWLER, BUILDING AT THE RISDON
IRON WORKS, SAN FRANCISCO, CAL.

dimensions are: Length over all, 211 ft.; beam, 27.2 ft.; depth, molded, 16.6 ft.; draught, 13 ft.; displacement, 612 tons.

C. Durm & Sons, Winans Cove, Baltimore, Md., have just launched a large gasoline propelled vessel for the Turner Transportation Co., Betterton, Md. The vessel is 90 ft. long and 22 ft. beam.

The Kennebec Steamboat Co., Bath, Me., is to have a new wooden steamer built on a model similar to that of the City of Rockland. She will be 270 ft. long and will have 200 staterooms.

A four-masted wooden schooner at the Kelley-Spear Co.'s yard, Bath, Me., building for Capt. F. J. Hinckley, will be named Frederick W. Day.

Work is progressing rapidly on the five-masted wooden schooner building in H. M. Bean's yard, Camden, Me., for Capt. J. G. Crowley of

The Maryland Steel Co., Baltimore, Md., will launch the torpedo

ENDURANCE TRIAL OF FRENCH SUBMARINE NAVAL

ENDURANCE TRIAL OF FRENCH SUBMARINE NARVAL.
Conflicting reports have appeared in regard to the recent severe trial to which the French torpedo boat Narval has been subjected, but the opinion in naval circles is that this vessel, which is the latest type of its class, and which has been selected as the model for four torpedo boats now under construction, has proved successful. The Narval is propelled by steam when navigating the surface and by an electric motor with accumulators when navigating under water. The great advantage of this system is that with the steam power it can recharge its electric accumulators. The Narval is 112 ft. long and is equipped to burn petroleum as fuel. It is provided with four torpedo tubes. The minister of marine recently ordered the Narval to make a cruise of forty consecutive hours. The Narval covered 350 miles at an average speed of $6\frac{1}{2}$ knots per hour. It is reported to have remained below the surface for several hours at a time. It is contended by the French that the Narval's endurance trial surpassed in result that of any other submarine now afloat.

MARINE REVIEW

Devoted to the Merchant Marine, the Navy, Ship Building, and Kindred Interests.

Published every Thursday at No. 418-19 Perry-Payne building, Cleveland, Ohio, by THE MARINE REVIEW PUBLISHING CO.

SUBSCRIPTION—\$3.00 per year in advance; foreign, including postage, \$4.50, or 19 shillings. Single copies 10 cents each. Convenient binders sent, post paid, \$1.00. Advertising rates on application.

Entered at Cleveland Post Office as Second-class Mail Matter.

The country has seen during the present week a great army of men lay down their tools at the behest of the labor agitators. These men who have quit work have no grievance against their employers. They are better paid than they have ever been in all their lives before. They were assured, too, in all reasonable certainty of a continuation of employment at excellent wages; and yet they went out to support the most preposterous and outrageous demand that has ever been made to an employer in the United States. Against the general principle of a union of labor the Review has nothing to say. Labor has just as much right to combine as capital has, and indeed it is frequently necessary for its own protection. But the sad thing about union labor (since the labor union cannot be dissociated from the labor leader) is the shocking lack of moral principle manifested. The labor union employs means which are not justifiable in law or morality. This is a severe thing to say but the pity of it is that it is the truth. It means the eventual overthrow of organized labor, as no force, no matter how powerful, can long offend the common sense of mankind or withstand the contempt of public opinion. The love of justice is inherent and its attainment certain. These men who have gone out of the mills of the United States Steel Corporation had no grievance. The trouble was not over wages. The corporation pays more than the union scale in several instances and in no instance does it pay less. Nor was the trouble over union labor as a principle. The corporation has freely expressed its willingness that the union organizers should have full liberty in its shops in their efforts to induce non-union men to join the union voluntarily. The demand of the union, in short, was that the corporation should unionize its non-union plants as a whole and compel its thousands of employees to become union men against their will. This is a virtual insistence that non-union men employed in non-union mills shall be discharged by the company if they do not join a union. And because the corporation very properly declined to do any such thing the strike was declared. There is not a thinking man in the whole United States who does not commend the steel corporation for its attitude or who does not regard with pity the thoughtless and suicidal action of the strikers. The independence of American manufacturing enterprises would be sorely challenged had the Steel Corporation acceded to the demands of the union. It is to be congratulated for doing what it did. The constituent companies directly affected are three—American Steel Hoop, American Sheet Steel and American Tin Plate. The American Steel & Wire Co., which is non-union, can duplicate practically all the business of the Steel Hoop Co. The Carnegie and other companies could probably duplicate the Sheet Steel Co.'s product. The corporation's business in tin plate, however, could probably be stopped if the strike continued long, as the American Tin Plate Co. is the exclusive manufacturer of this product. Mr. Morgan and Mr. Schwab have made no statement as yet regarding the situation.

The recent venture of the Staples Coal Co., Taunton, Mass., in long-distance coal towing has been proved successful. The tug Cuba, built for the company by the Bath Iron Works, Bath, Me., has just successfully towed two coal barges, each 300 ft. long and carrying 2,888 tons of bituminous coal, from Philadelphia to Cuba. The Cuba is 166 ft. long, 29.4 ft. beam and 18.9 ft. deep. Her gross tonnage is 650 and her bunker capacity 350 tons. She is of 1,100 H. P. and is thoroughly equipped, have steam steering gear, complete electric light plant, including a powerful search light and triple expansion engines fed by two single ended Scotch boilers. She also has two masts carrying jib, main staysail, mainsail and foresail for auxiliary power. The Cuba is about to leave Philadelphia again with two barges, each carrying 3,000 tons of bituminous coal. It is understood that the company is so pleased with the venture that it will build a sister tug to the Cuba. Eastern vessel men believe that the experiment opens up a new field in shipping. The total crew of the tug and two barges was thirty-two men, while a steamer would require a crew of thirty-seven and consume far more coal. The demand for coal at Havana is growing, but hitherto all coal has been carried there in foreign bottoms. It will now go in American ships. It is estimated that if the tug Cuba makes four successful trips to Cuba and back she will pay the cost of her construction and that the returns on the investment will be large. It is quite likely that this experiment will be followed by an attempt to tow barges across the Atlantic. It is calculated that a powerful tug should maintain an average speed of eight knots across the ocean with a tow. The record for towing on the great lakes

was made this summer when the steamer Gen. O. M. Poe of the steel corporation towed the steel barges Jenny, Fritz and Smeaton with an aggregate cargo of 27,300 gross tons of iron ore. The steam towing machine, which is now a part of the equipment of all big tows, both on the Atlantic seaboard and the great lakes, and which permits of the use of very heavy steel hawsers, has, of course, been a great factor in the development of this method of moving great quantities of freight on low expenditure of steam power.

The opinion is prevalent that British naval architects are being consulted freely in the design and construction of some of the mammoth steamers now building in Atlantic coast ship yards—for instance as regards the very large steamers for Pacific service building at the works of the Newport News Ship Building & Dry Dock Co. and the new Eastern Ship Building Co. of New London, Conn. It may be stated on the best of authority, however, that the only foreign naval architects, engineers or ship builders who have been in any way connected with the production of the vessels referred to are the London committee of the British Lloyds, and in the case of the Eastern Ship Building Co.'s vessels—the big Hill Pacific liners—the design and scantlings were immediately accepted and very favorably commented upon by this standard classification society. These great ships are to be American from stem to stern and keel to truck, and will be the product exclusively of the officers of the New London ship yard. The Pacific Mail steamers building at the Newport News works are also full of original American ideas.

The coal and coke properties of the United States Steel Corporation will be merged into the H. C. Frick Coke Co. While the plants will be bought outright by the Frick company the transaction is merely that of changing money from one pocket to the other. The merger, however, dispenses with the services of several persons who held responsible and lucrative positions. This policy is being pursued by the great corporation in all its departments. The sinking of the identity of the National Steel Co. and American Steel Hoop Co. into the Carnegie Steel Co. automatically removed a list of highly salaried presidents, secretaries, treasurers and sales agents. Several of the men removed have made names for themselves in the manufacturing world. They are removed, not because they are not able, but because they are superfluous.

FREIGHT RATES ON MINNESOTA ORE ROADS.

Duluth, Minn., July 17.—In their fight to retain present charges on iron ore from the Minnesota mines to Lake Superior, the three Minnesota ore roads have brought up the contention that their traffic is interstate. If so it is beyond the jurisdiction of the state and probably not within that of the interstate commerce commission except when the ore is carried clear through on lake and rail carriers under a common control. The claim that ore traffic between the mines in Minnesota and the docks at Duluth and Two Harbors, in the same state, is interstate, is not so revolutionary as appears at first glance. In point of fact it coincides precisely with opinion after opinion by the United States supreme court. The definition of interstate traffic as made by Mr. George Welwood, counsel for the Duluth, Mesabi & Northern road, basing his definition on supreme court findings, is "the passage of merchandise from state to state by a journey practically continuous, even though that journey may be interrupted by delays, such as examinations at custom houses, transshipment from car to car, rail to lake, etc.; even though, also, common control of the traffic through way bills, through bills of lading, etc., may be lacking."

Mr. M. D. Grover, counsel for the Eastern Minnesota Railway, said that "traffic was interstate if, when delivered to initial carriers, it is destined to points beyond the state. It makes no difference how many acts influence its destination, or intervene in its passage, if that destination is beyond the state of its inception."

Mr. Frank B. Kellogg, counsel for the Duluth & Iron Range Road, argued as to interstate character of the traffic and control by the interstate commerce commission and admitted that over much of the ore business the national commission had jurisdiction. This was where there was a common control of ships and railway lines or an agreement on through business and through rates. He cited the agreements of the Duluth, Mesabi and Northern road and the late Bessemer Steamship Co. as to Carnegie ore, the agreements between the Duluth & Iron Range road and the late Minnesota Steamship Co., and the agreements between both roads and the present Pittsburgh Steamship Co. It made no difference, he urged, that the road's proportion of this rate was fixed and the steamship's fluctuating, which was a circumstance common the world over.

All these arguments were backed by ample citations and strong proof, and the state railway commission is now admittedly very much shaken in the belief of its own jurisdiction. It will probably hold, however, that it does control, but may think the matter sufficiently in doubt to require an opinion by the courts of law.

Messrs. Uhler & Co., Seventh and K streets, Washington, D. C., and Mr. E. A. Burnside, Point Pleasant, W. Va., have been appointed agents for the well-known elastic seam composition and elastic seam paint for decks and all other seams, weather checks, etc., made by Cole & Kuhls, foot of Twenty-fourth street, Brooklyn, N. Y. The sale of this composition and paint is steadily increasing in all parts of the country.

One fare for the round trip to the Pan-American exposition at Buffalo via the Nickel Plate road beginning June 1 and continuing the entire summer; good returning within ten days from date of sale. Write, wire, 'phone or call on nearest agent, or E. A. Akers, C. P. & T. A., Cleveland, Ohio.
84, Aug. 1.

AN APPARENT BUT NOT ACTUAL DECLINE IN EXPORTS.

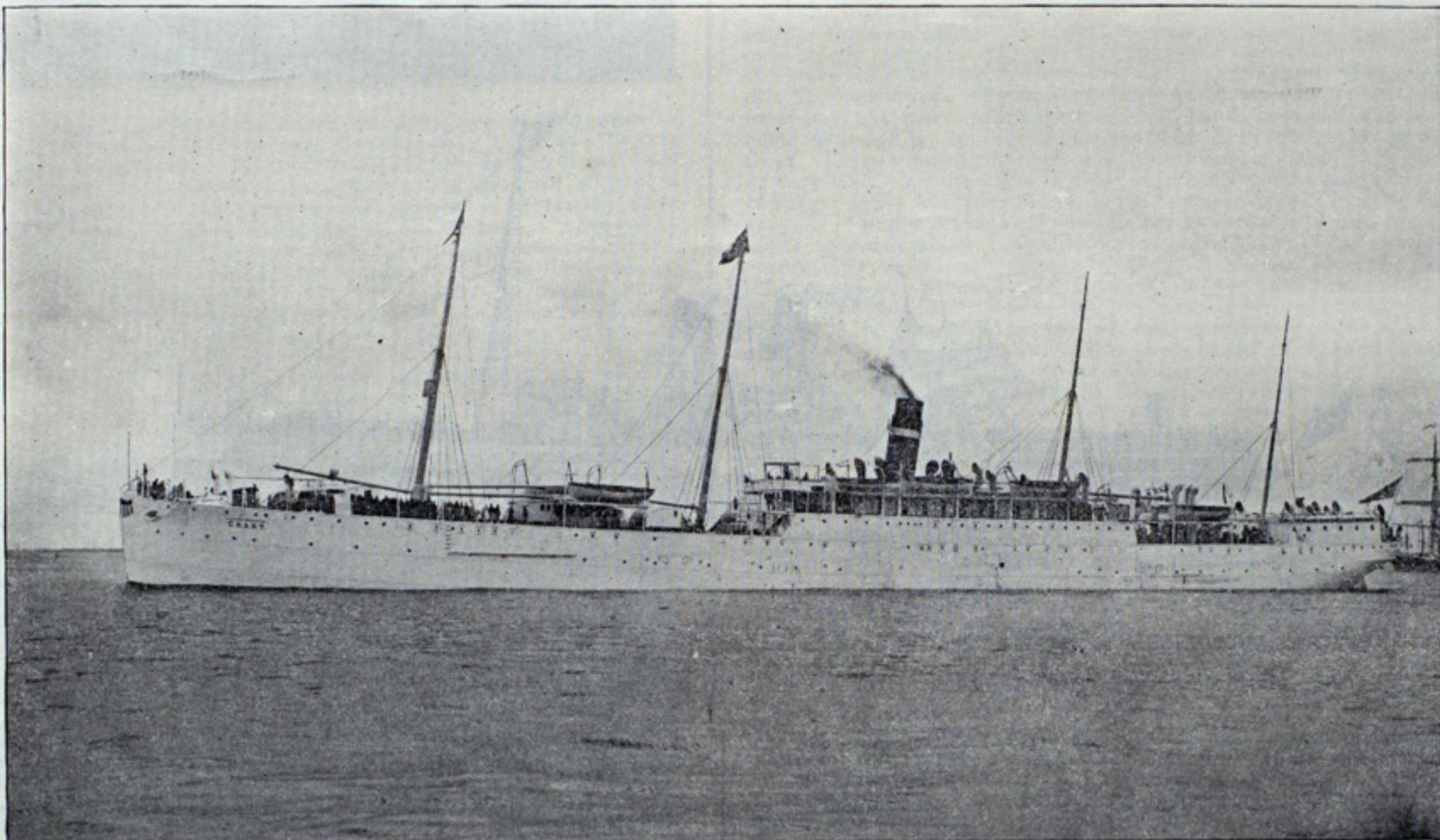
Exports of manufactures from the United States appear to be slightly less in the fiscal year just ended than in the preceding year, the figures for the eleven months ending with May showing an apparent reduction of \$14,565,030. This statement, however, is misleading, because the figures of the year 1901 do not include the exports to Porto Rico and Hawaii, which were included in former years, and which are largely manufactures and which will aggregate \$25,000,000 for the fiscal year. Were it possible for the treasury department bureau of statistics to include in its figures of exports of manufactures those sent to Hawaii and Porto Rico, the figures of 1901 would differ little from those of 1900. Indeed an analysis of the general export figures of manufactures for the eleven months now available shows in most cases an increase over 1900, and that the decrease is confined to a few articles and is due, in some cases at least, to a fall in price rather than a reduction in quantity. In illuminating oils, for instance, the export figures for the eleven months ending with May, 1901, show a decrease of \$4,500,000, but an increase of nearly 50,000,000 gallons, the accurate figures being: For eleven months ending with May, 1900, gallons 663,554,528, and value \$51,753,797; and for the eleven months of 1901, gallons 711,842,276, and value \$47,228,483. Two other great articles of our exports of manufactures show a reduction in 1901 as compared with 1900, namely, copper and cotton manufactures, and these, indeed, form the chief reduction in the grand totals for the year 1901 as compared with 1900. In cotton manufactures the reduction is due entirely to temporary conditions in China. The total exports of cotton manufactures in the eleven months ending with May, 1901, are

to a fall in price, while there has been an actual increase in quantity; and, 4th, that in the principal item of decrease, copper, the figures exceed those of any preceding year except 1900, in which year the demand abroad for electrical works was far beyond that of any preceding year.

TRIALS OF HYACINTH AND MINERVA.

As noted in these columns last week, two ships of the British navy, Minerva and Hyacinth, the one fitted with cylindrical boilers and the other with Belleville water tube boilers, left Portsmouth, England, recently for a trip to Gibraltar and return, on which they were to be subjected to a very thorough test along the line of investigations that are being made by the boiler committee appointed by parliament some time ago. Unfortunately information regarding this special trial is as yet meager, as the Hyacinth met with an accident, but previous to the departure of the vessels for the Mediterranean an exhaustive series of trials extending over several weeks was carried out. All the members of the boiler committee (authors of the celebrated interim report) were on board. The machinery and boilers were managed by the ships' own engineering staff.

The Minerva has eight cylindrical boilers with 19,200 sq. ft. of heating surface, and the Hyacinth has eighteen Belleville boilers with 17,000 sq. ft. of boiler heating surface and 7,000 sq. ft. of economizer heating surface, making a total of 24,000 sq. ft. against 19,200 sq. ft. in the Minerva. The steam pressure in the boilers of the Minerva is 150 lbs. to the square inch, against 300 lbs. in the Hyacinth, and the steam pressure at the engines is 150 lbs. and 250 lbs. respectively. The weight of boilers, with water, in



United States army transport Grant.

\$17,275,299, against \$22,080,583 in the corresponding months of last year, a reduction of \$4,805,284; while an examination of the figures of the exports of cotton to China shows that they fell from \$8,288,946 in the eleven months of 1900 to \$3,004,727 in the same months of 1901, a reduction of \$5,284,219 in this item alone. Thus the reduction in the exportation of cotton manufactures is entirely accounted for in this single item of cotton cloths to China, where the reduction is, of course, but temporary, due to the disturbances in that country during the first half of the fiscal year. The only remaining item in the list of exported manufactures which shows a material reduction is copper, which shows a fall of 63,721,840 pounds in quantity, and \$11,849,518 in value, during the eleven months ending with May, 1901, as compared with the same period of 1900, though the value of copper exports in 1901 is more than \$6,000,000 in excess of the corresponding months of 1899.

In a large share of the important articles of our exports of manufactures the figures of 1901 show a marked growth over those of the preceding year and of any preceding year. In steel rails, for instance, the exports during eleven months of 1901 are more than \$2,000,000 in excess of the same months of last year; in pig iron there is an increase of \$1,000,000; in bars and rods of steel an increase of \$1,500,000; in electrical machinery, \$1,500,000; in boots and shoes, over \$1,000,000; in cotton seed oil, nearly \$2,000,000; in carriages and cars, \$2,000,000; in chemicals, more than \$1,000,000; in scientific instruments, \$1,000,000; while, as already indicated, in some cases where the values have decreased there is still an increase in quantities, the apparent reduction being due to the fall in price and not to a reduction in the quantity exported.

American manufacturers have, therefore, no occasion for anxiety regarding the slight apparent decrease in the export figures of manufactures in 1901, which is due: 1st, to the fact that shipments of goods to Porto Rico and Hawaii aggregating more than \$20,000,000 in the year just ended, are no longer included in the list of exports, as was formerly the case; 2nd, that the reduction of over \$6,000,000 in exports of cotton and cloth and mineral oils to China may be looked upon as due entirely to temporary causes; 3rd, that in numerous instances the reduction is due

the Minerva is 340 tons, and the weight, under the same conditions, in the Hyacinth is 280 tons. The maximum indicated horse power for an eight hours' run in the Hyacinth is 10,000 and in the Minerva 8,000. Both ships are sheathed and are of the same displacement.

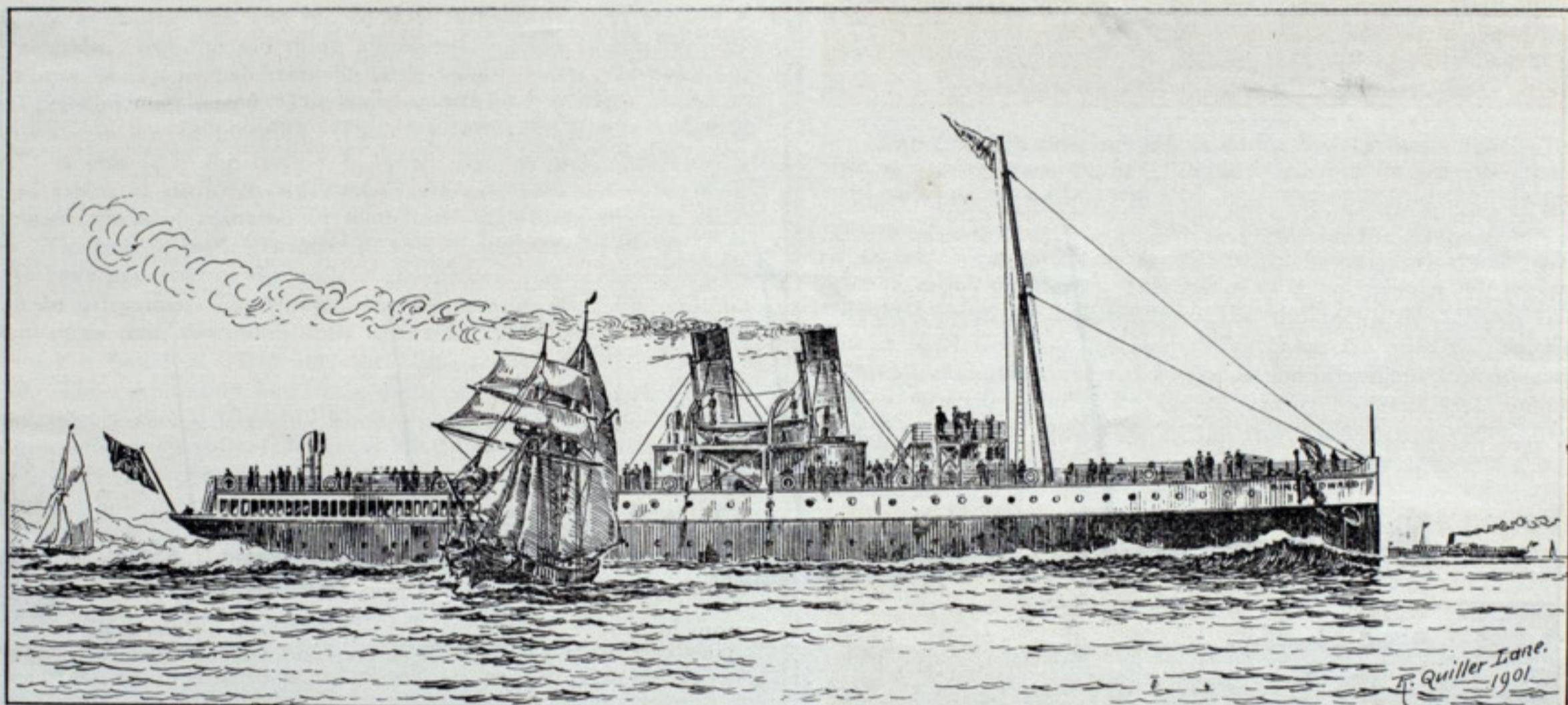
The London Times thus describes results of the trials: "The Minerva carried out her trials first, and on a twenty-four hours' run at 2,000 I. H. P. she burned 2.2 lbs. of coal per unit of power per hour for all purposes, while on a corresponding trial the Hyacinth consumed 2 lbs. The evaporation of water per pound of coal in the Hyacinth was 9.7 lbs., and in the Minerva 8.7 lbs. The speed of each ship was 12 knots. At the twenty-four hours' trial at 5,000 I. H. P. the coal consumption in the Minerva was 1.74 lbs. per unit of power per hour, and in the Hyacinth 1.84 lbs., and while the evaporation of water per pound of coal in the Minerva was 8.9 lbs., in the Hyacinth it was 9.5 lbs. Here, again, both ships gave the same speed—16 knots. On her eight-hours' trial at full power, or 8,000 I. H. P., the Minerva's coal consumption was 2.4 lbs. per I. H. P. per hour, while on the eight-hours' trial at 10,000 I. H. P. the coal consumption of the Hyacinth was 2.1 lbs., the speeds being respectively 18 and 20 knots. The water evaporated per pound of coal in the Minerva was 8.1 lbs., and in the Hyacinth 8.8 lbs. Here, according to the original program, the trial ended, but the Hyacinth had not done a run at 8,000 I. H. P., and a further trial at that power was necessary to complete the series. The coal consumption was 1.8 lbs. per unit of power per hour, and the water evaporated per lb. of coal was 10 lbs. The speed recorded by the patent log was 18½ knots. At each run boilers, machinery, and engine-room staffs worked smoothly and gave no trouble of any kind. So far as the trials have gone they have shown a superior economy in the Belleville boilers of the Hyacinth, with a compensating extravagance on the part of the engines of that ship. That is to say, each pound of coal burned in the Hyacinth evaporated more water than the same quantity burned in the Minerva, but the Hyacinth's engines required the extra steam to produce the same power. The coal consumption at the various trials varied, and the result cannot be regarded as conclusive; but the Hyacinth has, at any rate, shown an advantage in speed."

TURBINE STEAMER KING EDWARD A SUCCESS.

It is a matter of considerable importance to the maritime world to know that the King Edward, a Clyde passenger steamer just built and equipped with turbine engines, is a sufficient success to justify the courage of her owners in building her. She is the first vessel for mercantile purposes to be equipped with Parsons' steam turbine machinery. The vessel is 250 ft. long between perpendiculars and 30 ft. molded breadth. Her molded depth is 10 ft. 6 in. to the main deck and 17 ft. 9 in. to the promenade deck. The vessel was built for Capt. John Williamson of Glasgow. Ship and boilers are the work of Wm. Denny & Bros. of Dumbarton, Scotland, and the turbines were built at the Wallsend-on-Tyne works of the Parsons Steam Turbine Co. The propelling machinery consists of three steam turbines working compound. These are placed side by side. In ordinary working, and when going ahead, steam is admitted from the boilers to the high pressure turbine, where it is expanded five fold. From thence it passes to the two low pressure or wing turbines placed one on each side, where it is expanded twenty-five fold, and then passes to the condensers. The total ratio of expansion is therefore no less than 125 fold. Each turbine has its own shafting; and on each of the wing shafts there are two propellers, while the center one carries only a single screw. When coming alongside a pier or maneuvering in crowded waters the wing motors alone are used, steam being admitted directly into them by suitable valves. The high pressure turbine is then shut off, the steam-admission valve being closed, whilst connection between it and the low pressure turbines is also shut off by an

it would be were ordinary engines used. Still another advantage due to the adoption of this machinery is the noiselessness with which it runs. So far as the turbines themselves are concerned, it is not possible to tell whether they are running or not by placing one's hand on them. There is, however, a very slight vibration that can be felt right astern, and this is due to the propellers. Whether this can be eliminated or not remains to be seen, but certainly no vibration is set up by the main engines themselves. At the bow end motion is similar to that of a fast-sailing yacht; and it might have been better had the main saloon been placed forward instead of aft.

It had been expected that the vessel would be very difficult to bring alongside a wharf, and, judging by experience with torpedo boat destroyers, the prediction was not unwarranted. This must always be more or less the case with lightly-built vessels having small rise of floor, little lateral resistance, and somewhat high superstructure. The fine lines of the King Edward, with her long bow and lean quarters, however, give a good deal of approximately vertical surface at the ends, and this probably accounts for the ease with which she took one of the piers on her first run on her regular route, made for experimental purposes. It is true the day was favorable, there being very little wind, but the pier in question is a very difficult one to take, lying right in the bight of a very narrow bay. Moreover, there were several yachts anchored off which hampered the pilot a good deal. In regard to the fine shape of the boat, it may be pointed out that the low center of gravity of the turbine machinery gives good stability without the necessity for a hard bilge or long floor; in fact, this type of machinery lends itself readily to a form



KING EDWARD, THE FIRST MERCANTILE VESSEL TO BE EQUIPPED WITH PARSONS' STEAM TURBINE.

automatic arrangement. There are special turbines placed inside the exhaust ends of the low pressure turbines for going astern with the wing screws. The whole of the maneuvering, excepting, of course, by the rudder, is effected by the manipulation of valves in a very simple manner. The feed pumping engines are worked separately, as are the circulating pumps and fans for forced draft. The main air pumps are worked by means of worm gearing from the wing shafts; but there are auxiliary air pumps, actuated by the circulating-pump engines, for clearing the condensers of water when the main engines are not in operation. There is a feed heater, which uses the exhaust steam, or steam taken from an intermediate point in the turbines if necessary. There is also a filter to clear the steam of grease. Other machinery usual on vessels of this class is fitted. The boiler is of the usual return-tube type, being double-ended, and having four furnaces each end. It is placed in a closed stokehold.

The trial of the King Edward was on the Firth of Clyde, and on a mean of runs over the Skelmorlie mile, a speed of 20.48 knots was registered. The weather was fair, there being but little wind. The mean revolutions were 740 per minute, the steam at the boilers was 150 lbs. to the square inch, and the vacuum 26½ in. The air pressure in the stokehold was equal to 1 in. of water. The indicated horse power was estimated at 3,500, there being, of course, no means of taking indicator diagrams with this type of motor.

The coal consumption has not yet been precisely ascertained, but it is said to be quite satisfactory so far as can be judged. The high speed attained on this trial is, no doubt, largely due to the fine shape of the vessel, the lines being tapered off very much both at bow and stern. The model has been subjected to a large number of trials in the Dumbarton experimental tank, and the result has been a very beautiful under-water shape. This keen bow and easy delivery are made possible by the lightness of the Parsons' turbine engines. The weight of the motors, condensers, with water in them, steam pipes, auxiliaries connected with the propelling machinery, shafting, propellers, etc., is 66 tons. This is considered to be about half the weight per indicated horse power developed of the average of the propelling machinery of paddle-boats of a similar type. There is also a gain in the hull construction due to the absence of paddle-boxes and sponsons.

Another advantage resulting from the use of the turbine machinery is the additional passenger accommodation that can be provided. This is due to the lowness of the form, enabling the engines to be placed under the main deck. The opening for the machinery space is small in the King Edward, and the actual length occupied is two frames less than

of hull conducive to high speed. The steamer is by far the fastest of her class, exceeding in speed most of her competitors by one to two knots.

Mr. Parsons is convinced that the steam turbine can be effectively adopted in any class of vessel of large size and great speed, though he does not recommend it for small slow vessels, and he offers with confidence to build turbine machinery for an Atlantic liner.

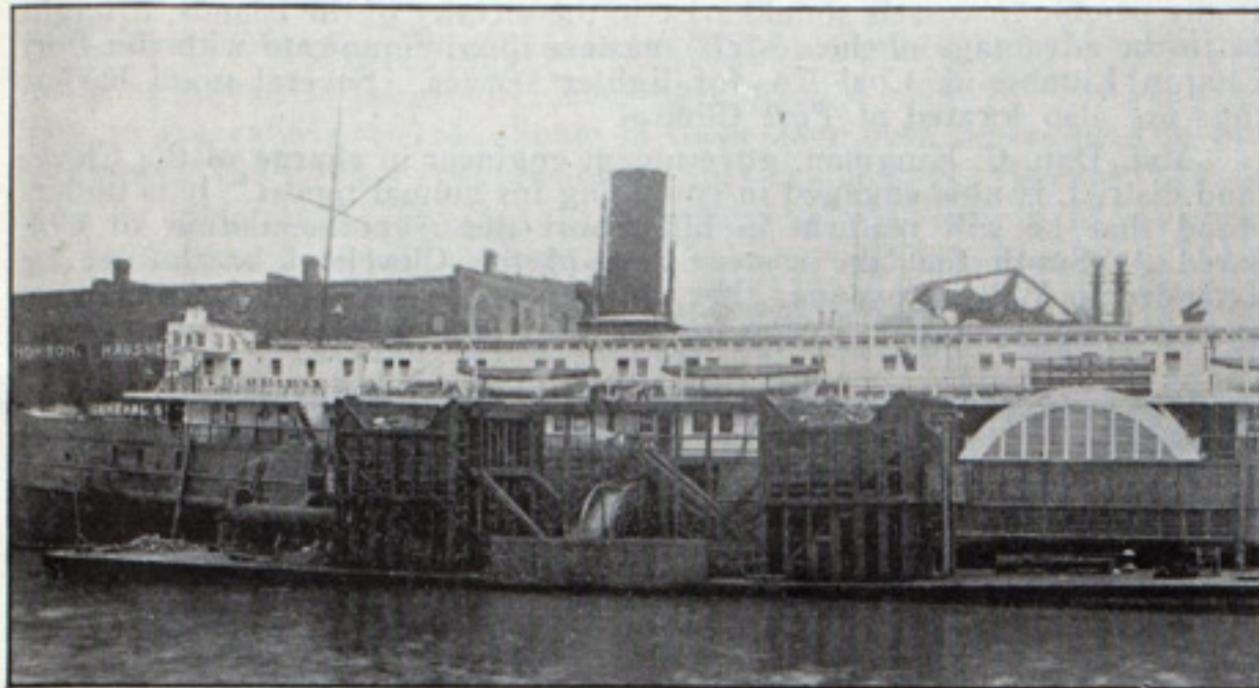
TENDERS FOR ATLANTIC STEAMSHIP SERVICE.

The department of trade and commerce of the Dominion government authorizes this week advertisements asking for tenders for the fast Atlantic steamship service which has been hanging fire for five or six years. It is well known that the sea voyage between several Canadian ports and Europe is much shorter than the steamship lane between New York and Liverpool. The jealousy of the various Canadian ports, however, prevents the Dominion government in its advertisement from specifying any one of them. The specifications call for a weekly service by a fleet of four steamships. The government has decided not to demand greyhound speed but rather to secure a rapid freight as well as passenger service at a maximum speed of 20 knots. It is not known as yet whether the imperial promise of a subvention will be granted, but the Canadian subsidy, which is at present \$500,000 a year, may be restored to \$750,000. Three months is allowed in which to make tenders and it is estimated that it will require two years in which to place the fleet in commission. The government inclines to North Sydney as the home port as the safest and most accessible in all seasons. It is 752 miles shorter than the distance from New York to Liverpool.

Secretary Long sent letters to the Carnegie Steel Co. and the Bethlehem Steel Co. last week requesting their co-operation in preventing delays in the construction of armored cruisers now on the stocks or authorized. The secretary explains that if the two companies do not deliver more armor within the next year than is required by their contracts the vessels ready for armor must wait. Such delays, he says in substance, may serve to prevent congress from authorizing more vessels at the next session. The contracts with the two companies provide for the delivery of 300 tons each month after the first year. The navy department has estimated that 500 tons a month each, deliveries to begin soon, are necessary to keep abreast of construction. Naval officials express confidence that the armor makers will show a disposition to assist the government.

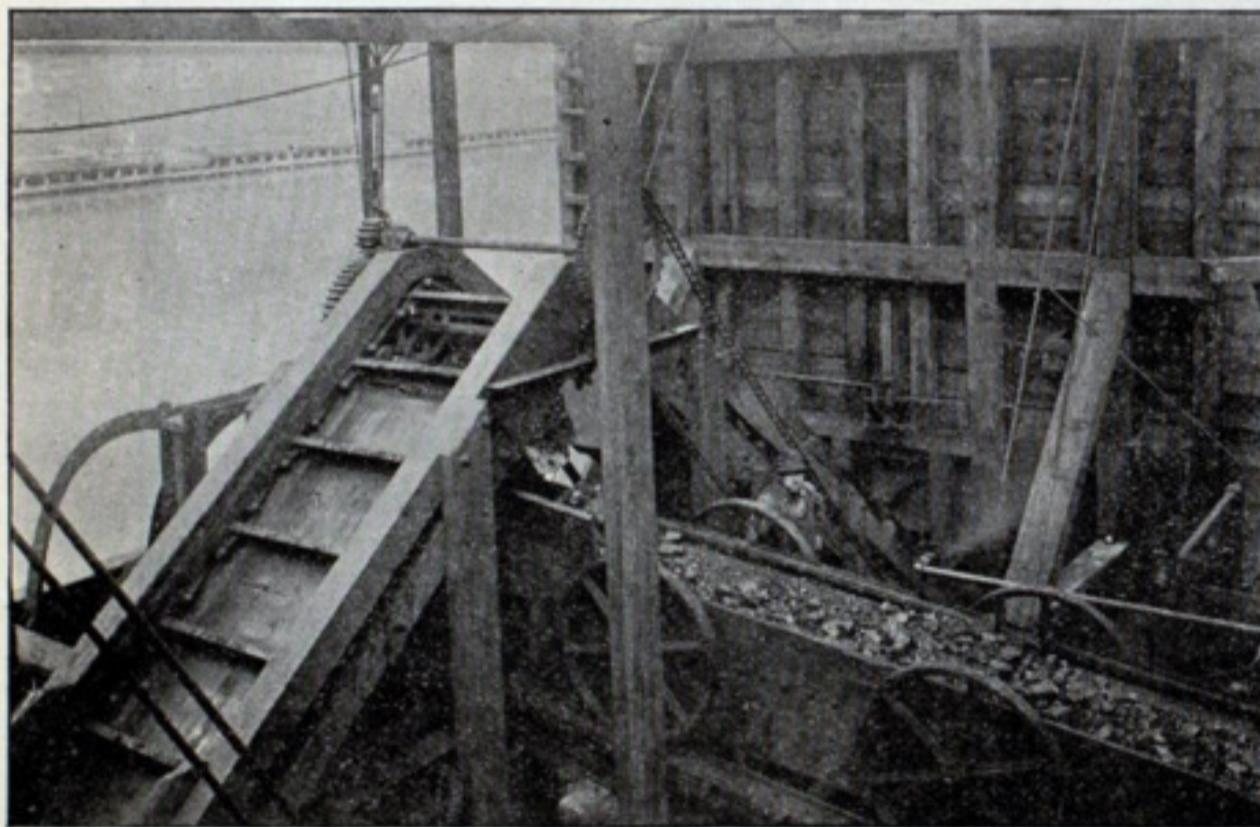
FOR FUELING SIDE-WHEEL STEAMERS.

In Cleveland and other lake ports, as in all the leading ports of the world, steam lighters are provided for the purpose of putting fuel aboard large vessels while they are taking on or discharging cargo. If the cargo taken aboard is coal, the ship's fuel is usually loaded at the same time. Every effort is made to have the ship lose as little time as possible in port, and as regards the matter of fuel the ship's loss of time is nothing like what it used to be. But in Cleveland, for instance, the side-wheel passenger steamers and some of the so-called line boats (package freight carriers), are so different in their construction to the ordinary freighter



that the fuel lighter, propelled by steam and carrying a great number of pockets of coal that are hoisted from the lighter to the ship's bunker openings by a crane, can not be used to advantage; and so it has been the practice with these vessels to have men wheel the coal aboard in barrows and dump it into the bunkers. This method is necessarily slow.

In Cleveland, where about 75,000 tons of coal is sold in a season to side-wheel steamers and other vessels that must have fuel wheeled aboard, the volume of business was found large enough to warrant the construction of a device specially suited to the work. John A. Donaldson, in charge of docks for the Pittsburg Coal Co., took up the matter of plans for such a device, and the result is shown in two pictures herewith of working parts of a barge built for the purpose. This coal barge, as will readily be seen by the illustrations, contains two large hoppers, the contents of which in coal is very rapidly transferred by an endless-belt system of carriers over the deck of a steamer and dropped into the bunker spaces.



Of course the barge is suited only to the low decks and open hatchways of sidewheelers and similar vessels, but there is business enough for it in Cleveland and it is a great labor saver. In an hour of continuous work it is capable of handling about 300 tons of coal.

The machinery in this device was built by C. O. Bartlett & Co. of Cleveland, who have also about completed for the Pittsburg Coal Co. a plant for loading cargo coal at Fairport that will have a capacity of about 600 tons an hour, sufficient to load the largest coal-carrying vessels in little more than a day. Extended reference to the Fairport plant will be made later on. It is for loading ships from hopper cars, those of the bottom-dump kind. The coal is dumped into large buckets that are carried on a conveyor, and the system is said to be even more rapid than that of the big machines that dump the entire car in one operation from the side or from the end.

Two naval auxiliary vessels, Rainbow and Supply, now being thoroughly overhauled at the Brooklyn navy yard, will soon be ready for service in the far east. Each has been fitted with commodious living quarters and will be model and comfortable ships for the officers assigned to them. The Rainbow, which was formerly a cattle ship engaged on the Australian line, will be the headquarters of the Philippine naval station. The Rainbow has twelve sets of water distillers installed on board and she can distill all the water for the fleet in the Philippines. The Supply will go to Guam, where she will be stationed as the flagship of the governor of the island.

Low rates to Milwaukee via B. & O.—account Grand Lodge B. P. O. E. Tickets on sale July 21 to 23, available for return to August 10. For particulars call city ticket office, 241 Superior street. July 18.

IS THE BOILER COMMITTEE REPORT TO BE MODIFIED?

Mr. Fred T. Jane, who was on the British cruiser Ariadne during the test of her Belleville boilers, contributes a very interesting article to the London Chronicle upon the boiler controversy. He is a staunch adherent of the Belleville boiler and thinks that the interim report of the parliamentary committee will have to be amended by the committee itself as it is beginning to find extenuating circumstances. He says:

"When the interim report of the boiler committee was issued and Bellevilles were utterly condemned (save by the solitary naval engineer member), all the anti-Belleville faction were happy and shook hands with each other over the fate of the accursed thing. Since then, however, a little rift has appeared within the lute. It was the simplest matter in the world to cross out the word Belleville and substitute the name of some other type, but now a difficulty has arisen. To use any of the other types seems likely to entail some quite unexpected problems. A certain weight of Bellevilles will give, say, 20,000 H. P., but the same weight of something else will give less power and consequently less speed. To get the designed horse power, weight will have to be increased; and to play that game satisfactorily with swift cruisers is a very ticklish thing indeed. Already two cruisers that are building, and for which Bellevilles were discarded, have been ordered to be fitted with Bellevilles after all; and this is probably only the prelude to similar orders for most of the ships building."

"The boiler committee issued an interim report that was decidedly anti-Belleville. An interim report is not, however, a final one; and there is evidence all along the line that this first report concerned itself chiefly with the theory of the matter. Now the committee is studying the purely practical side, and already there are indications that they are likely to reverse their judgment. It is just as well to remember that the people most nearly connected with the Belleville—the men who have to use them and stake their lives on that use—do not condemn them. The condemnation is from certain members of and certain newspapers who certainly have not got their information at first hand, because there is not a naval engineer in the service, trained with Bellevilles, who agrees with them. The few naval engineers who object have done no Belleville work, or very little, and the value of their objections can be gauged from that. If we go to the warrant officers of the engineer branch, exactly the same attitude is found. The artificer-engineer is certainly a man who should know as much about Bellevilles as any parliament. An article in the current 'Naval Warrant Officers' Journal' likens the objection to Bellevilles to the objections that were raised (effectively, too, for a long while) to the breech-loader. The writer sees nothing wrong except unscientific stoking. He certainly does not see that substituting some other untried type of water tube boiler will enable a raw stoker to make no mistakes."

"Every naval engineer officer who has had any solid experience with Bellevilles believes in them and is content with them. All they ask is to be supplied with trained staffs and trained stokers, or, failing that, to be able to do a little practice beforehand, instead of being rushed off to sea to shake down as best they may. There is not a water tube boiler in the world that can be depended on to do well under such conditions; the wonder is, not that early breakdowns are so many, but that they are so few under such conditions. Of breakdowns, real and imaginary, we hear a great deal; when there is no breakdown, there is silence. Let us for a moment lift the veil of that silence, and look at some facts. In the naval maneuvers last year several ships fitted with Belleville boilers were mobilized; most of their stokers and some of their junior engineer officers were quite inexperienced so far as Bellevilles were concerned. But the admiralty, with some prescience, sent these to the ships three weeks beforehand. Three weeks is not a long time to learn a new trade in; but what was the result? Despite all the subsequent rush and pressing, not a single one of these ships broke down in any way connected with the boilers. Some of them consumed a good deal of coal, but that is the sole charge that the strongest opponents of the Belleville boilers could bring against them."

"The Ariadne is a good case in point. Her three senior engineer officers had served before with Bellevilles, but the other officers had not. More than half the stokers were absolutely raw second-class ones, the Ariadne their first ship. Yet this vessel did over 2,000 miles of rushing about, generally at 19 to 20 knots speed, fires going from the moment she left Portsmouth till her return. I was on board this ship, and recorded it at the time. The Vindictive made a similar record. So did the Gladiator. Is all this pure chance and coincidence? Again, take the cruisers of the channel fleet. The Diadem has been about for years, but nothing goes wrong; the Niobe, after some preliminary trouble (not connected with boilers), has done excellently. In the Mediterranean no word of trouble has come from the Canopus; on the China station sisters to that ship never break down. The Terrible, almost the first experiment in Bellevilles, does excellently. The Powerful, after her first troubles, did splendidly, and steamed 22 knots for twenty-four hours—the world's record in that direction. The much-abused Highflyer has done 12,000 miles without trouble on the East Indian station; her own people say that the first they learned of her troubles was from the English newspapers!"

"These are pretty solid and hard facts, and it needs more than a fractured piston-rod or leaky condenser to prove that the Belleville is a failure. It is facts such as these that the boiler committee now has to assimilate and square with adverse theory—if it can. Little wonder is it that there are signs that the committee is beginning to detect extenuating circumstances. If British naval engineers as a body complained of the Belleville, grumbled about it and demanded a substitute, then to search for a substitute would be logical enough. The trouble is that things are quite the other way. But the British navy itself does not appear to be considered entitled to hold an opinion of value. The main question today is this, 'Is the British navy the best judge of its own needs, or are other people?'"

Geo. Crouse Cook, whose home is at Fort Plain, N. Y., and who is known to readers of the Review through several articles contributed to these columns while following up in ship yards of Great Britain and Germany the study of naval architecture begun in this country, was recently awarded by the Glasgow University the naval architecture prize, senior class, for highest marks in advanced theoretical work during the season of 1900-01. Mr. Cook is the first American from civil life who has been honored in this way.

AROUND THE GREAT LAKES.

Capt. August Ames of Detroit, formerly in the steamer John Harper, will sail the Detroit steamer Colonel, launched at that port a few days ago.

A freight house to cost \$100,000 will be built at once by the Lehigh Valley Transportation Co. at Buffalo to replace the house destroyed by fire recently.

The wooden schooners Thomas Sheldon, Verona, M. S. Bacon and W. S. Crosthwaite of the Gilchrist fleet have returned from the coast where they went two years ago.

Dunbar & Sullivan, dredging contractors at Buffalo, are making preparations for the removal of practically their entire plant to Detroit in August. The firm has one-half of the Lime-Kiln cut contract, the total of which is \$250,000.

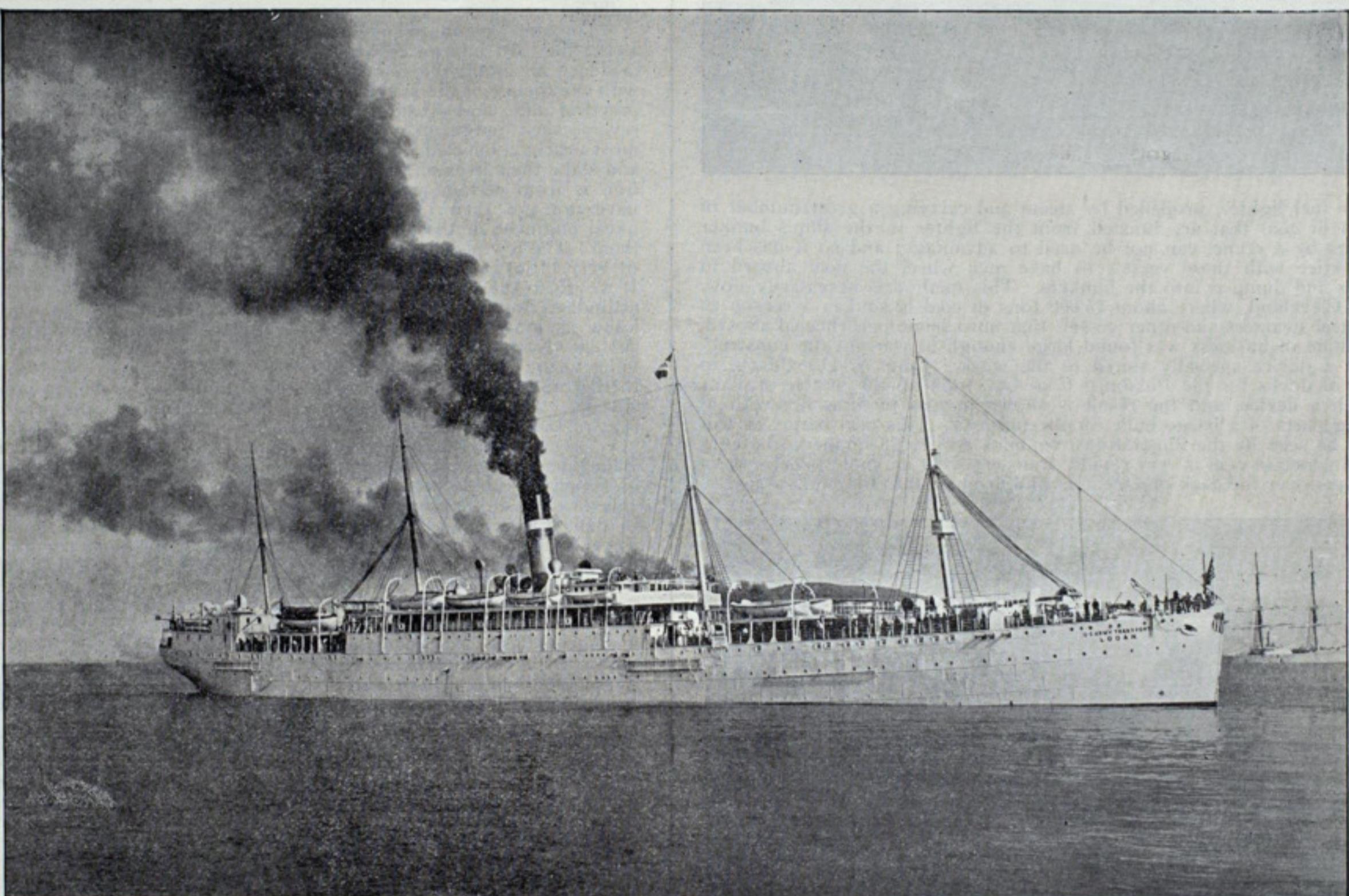
Major Dan. C. Kingman, government engineer at Cleveland, is soliciting bids for a naphtha launch to be used in general work about the Cleveland harbor. It is to have at least 28 H. P. and must be 30 ft. over all and not less than 6½ ft. beam.

Capt. N. W. Kirtland, one of the old time vessel masters, died at Sturgeon Bay, Wis., last week at the age of seventy-six years. During

she suffered a collision with a dredge and ran aground, necessitating further repairs and consequent delays. Her sister ship, the Northman, which left Chicago May 8 and went to Antwerp, returned to Buffalo a few days ago and is expected to reach Chicago on Thursday of this week. Aside from delays on the first trip, however, it is certain that the steamers can not be counted upon to make over four round trips between Chicago and Europe during the lake season of navigation.

Port Clinton harbor is now in shape to care for vessels loaded even deeper than is permitted by the draft of water available in entering. The Port Clinton Lumber & Coal Co. has acquired a lighter from Lake Huron with a capacity of 125,000 ft. of lumber or 150 tons of ore or coal. If any trouble to vessels should arise in the vicinity of the islands, it might be to the advantage of the vessels' masters to communicate with the Port Clinton Lumber & Coal Co. for lighter service. Several good harbor tugs are also located at Port Clinton.

Maj. Dan. C. Kingman, government engineer in charge of the Cleveland district, is now engaged in compiling his annual report. It is understood that he will reaffirm in his report the recommendation of Col. Jared A. Smith that the eastern arm of the Cleveland breakwater be extended to Willson avenue. He will also recommend the building of a special steam hydraulic dredge for the Cleveland district at an estimated



United States army transport Logan.

his early career on the lakes he was employed by the Goodrich Transportation Co., commanding the steamers F. W. Backus and Ottawa.

Barry Bros. of Chicago, who have purchased the steamers Empire State and Badger State for service on Lake Michigan, will take possession of them this week. New boilers will be placed in them, electric lighting plants installed and the passenger accommodations improved and enlarged.

Reports from Milwaukee coal dealers show that the total receipts of soft coal to July 1 of this season have been 164,494 tons, against 265,590 tons for the same period last season, a decrease of 101,096 tons. The total receipts of both hard and soft coal thus far this season amount to 344,809 tons, against 455,503 tons during the same period last season. It will thus be seen that the decrease is almost entirely in soft coal.

Mr. T. T. Morford, who was for many years connected with the Lake Line Agents' Association in Chicago, in an official position, and at the time of his transfer to Buffalo as general manager of the Union Steamboat line and Lehigh Valley Transit Co., its president, has tendered his resignation and the same has been accepted. In accepting his resignation from the presidency the Lake Line Agents, at the same sitting, made Mr. Morford a life member of the association. J. C. Evans has been made president and H. B. Lord secretary.

The Northwestern, the first of the Northwestern Transportation Co.'s four steamers to return from Europe, reached Chicago on Wednesday of this week. The voyage consumed three months, less six days. This, however, is no criterion upon which to base a schedule, as the Northwestern encountered unusual obstacles. She was for several days locked in an ice jam in the St. Clair river on her way out and spent nearly a week in getting a new wheel at Detroit as a result of the encounter with the ice. Later, in going through the Galoupe rapids of the St. Lawrence

cost of \$250,000. This is the outcome of a consultation with Maj. Hanbury of Detroit, dredge expert for the engineers of the lakes.

Anything that will tend to gain time for ships, even a half hour in a voyage of six or eight days, meets with favor from the lake vessel master, who is always aiming to keep at the head of the procession and who counts upon the possibility of a few hours on some particular trip meaning the loss of a voyage to him in the season. As an instance on this score it is noted that a supply house on Smith's coal dock in the Detroit river, a store furnishing groceries, meats, etc., is building up a large business in connection with the dock operations, and for the reason also that even where fuel is not wanted vessels may run up to the coal dock and get away again with whatever they require in a provision line far more expeditiously than at the upper river-front docks. Of course the provisions furnished and the service given at the new store, which is operated under the name Marine Supply Co., is in keeping with the thorough business management of the dock.

The tenth annual convention of the International Longshoremen's Association adjourned at Toledo after the election of the following officers: D. J. Keefe, president; H. C. Barter, secretary and treasurer; John T. Walsh of Cleveland, first vice-president; John J. Sullivan of Erie, second vice-president; Gordon O'Neil of Duluth, third vice-president; J. J. Joyce of Buffalo, fourth vice-president; Wallace Barber of Manitowoc, fifth vice-president; James E. Porter of New Orleans, sixth vice-president; Anthony J. Williams, Jr., of Erie, seventh vice-president. The next convention will be held in Chicago. Headquarters of the association will hereafter be in Detroit, and both president and secretary will be located there. President Keefe is a delegate from the American Federation of Labor to the British Trades congress, which meets in England in August. Mr. Keefe has been given a two months' leave of absence by the longshoremen, and while abroad will investigate the condition of dock workers in England and on the continent.

The Manager's Chair.



T is with pride that the manager for once departs from the usual custom of publishers and publicly addresses his subscribers. It is with pride because the subject of which he speaks lies nearest to his heart—the quality, excellence and widespread nature of the advertisers of the Marine Review. There must be some reason why these two hundred and more firms spend money for advertising in its columns.

These firms are carefully and conservatively organized and they are not throwing money to the winds. They have made it a rule of their business lives to get value received. Some of them have been represented in the columns of the Review ever since the paper has been in existence. There must be some good reason why a manufacturer will continue to advertise in the Review year in and year out. There is only one reason why he should continue to do so and that is the fact that he gets the worth of his money. Let anyone glance through the advertising columns of the Marine Review and he will see that the leading firms which cater to the great maritime trade of the United States are represented. It is the high character of the advertising patronage that makes the manager take such pardonable pride in directing attention to the advertising columns. In all modesty we say that we do not think there is a trade paper published whose advertising columns present an array of firms of such unvarying excellence. Integrity is stamped upon the name of each one of them. They made their reputations by turning out a superior class of goods. They would regard a bad bit of workmanship as a crime. The companionship, weekly, of such a company as this has made the Review careful to see that it, too, was worthy through its workmanship of associating with such a company. It has been the inspiration to produce a good paper.

We believe, sincerely and soberly, that there is no better means of reaching the ship building field and its allied trades than through the Marine Review. There is not a bit of waste tissue in its circulation. Every man who gets a copy of this paper gets it because he has paid for it; he has paid for it because he wants it. If any manufacturer in the United States is making anything that belongs to a ship he is not getting all the trade that is coming to him if he does not advertise in the Marine Review. There isn't a purchaser of ship equipment in the United States who does not take the Marine Review. We know what we say when we make the deliberate statement that the classified index of advertisers, published weekly in the Marine Review, is the directory which hundreds of purchasers use when they are looking for ship tools and ship equipment. Why? Because it is a living directory. There isn't a bit of dead wood in it. The men represented in it are doing business at the old stand—and the old stand is at the head of the procession.

Let us look at them for a minute. You can find them all in the front and rear pages of this issue. We might point with especial pride to the advertisements of such great ship building concerns as the Cramp company, the Union Iron Works, the Newport News company, the American Ship Building Co. and others, but the Review could not lay claim to first place as a marine publication without the patronage of these leading organizations. It is to the variety of the advertising, and still its high general standard, that attention is invited.

There is, for instance, the Lake Shore Engine Works of Marquette, Mich., makers of marine gasoline engines. They haven't been in that business very long, and, therefore, they haven't been advertising very long. But they began right, and they're making one of the staunchest engines on the market. They'll be very glad to tell you how one of them acted in a United States life boat.

Then there's the Electro-Dynamic Co. of Philadelphia. Their output is electric equipment generally. They have several specialties that a ship needs and they have the very good sense to change their advertising frequently and to only speak of one of them at a time. Thus eventually they all get the mention they deserve.

The American Steam Gauge & Valve Mfg. Co. of Boston, the makers of gauges that gauge, indicators that indicate, and pops that pop, have been before the public for half a century, and everybody knows that their products do exactly what they say they do. Also known all over the world and highly regarded are the Ashton Valve Co. and Crosby Steam Gage & Valve Co. of Boston, who are manufacturers along similar lines.

General Electric and Westinghouse are names so common in the electrical world that the school boy knows them. These great institutions are noted for shrewd advertising. Their methods are somewhat different. A peculiarity with the Westinghouse companies, which maintain an elaborate publishing department, is constant change of advertising matter. A change of Westinghouse advertising is on hand just as regularly as the Review goes to press each week. There has never been the slightest variation from this rule, and be it said to the credit of the Westinghouse advertising management that "copy" is always furnished in time to admit of proof being checked well in advance of publication.

The Bertram Oil Polish Co., Boston, Mass., has been with the Review ever since the Review was a baby, and are with it now in its

lusty youth. The Review is glad to know that their business is expanding. When a firm's business expands there is some sound reason for it. You can hippodrome a poor article into a temporary sale but the first requisite for permanent success is a good article.

The Bullock Electric Manufacturing Co. of Cincinnati is a big institution, but it isn't so big that it cannot give attention to the slightest detail. Even its catalogues are exquisite affairs. If anyone wants to know what it makes in a marine line write for catalogue—well, we have forgotten the number of the letter of the alphabet whichever it is—but they know and will send it to you.

The Brown Hoisting Machinery Co., Inc., of Cleveland, are engineers, designers and manufacturers of special machinery for handling coal and ore. In 1855 the old Cleveland Iron Mining Co. managed to get through the Sault Ste. Marie canal 1,447 tons of iron ore. It was hoisted out of the hold of the little brig in buckets by hand power. Last year nearly 20,000,000 tons or ore were brought down. If the system of unloading had not been simplified through the use of steam hoisting and conveying machinery they never would have gotten that ore out of the holds of the vessels. Without the conveyors they couldn't possibly handle 20,000,000 tons of ore in a season. That's what the Brown Hoisting Machinery Co. has done for the great lakes.

The Continental Iron Works of New York has been advertising in the Review since time immemorial and the person who does not know of Morison suspension boiler furnaces has been living in the woods. They produce a very superior article.

We are all familiar with the celebrated painting of the launch of the life boat from the liner's deck. It has become associated with the Standard automatic releasing device, manufactured by the Standard Automatic Releasing Hook Co., New York, and the device, which will release a boat in any kind of sea, is well worthy of its reputation.

The Hamilton-Foster Fog Signal Co. is a new company and its product is decidedly new. They have a machine which will convey sound to each of the eight points of the compass, thereby conveying to the mariner its exact location. Anyone who has endeavored to tell the direction of sound at sea will appreciate the value of this machine.

Bement, Miles & Co. of Philadelphia and the other organizations making up the Miles-Bement-Pond Co. make a specialty of machine tools. Some of their tools are especially adapted to ship building, and they have used the columns of the Marine Review almost since its first issue. They will gladly send a catalogue to anyone interested upon inquiry.

The W. & A. Fletcher Co. of Hoboken, N. J., have been with the Review as patrons for years. Latterly they have come in for unusual attention, for did they not build the engines of the victorious City of Erie in the great race with the Tashmoo? This firm is a thorough believer in its engine powers of application, and with very good reason.

Nothing has brought the machine tool into the ship yard like steel. When wood was discarded for ship's hull and steel employed the demand for tools became immediate and insistent. One of the greatest which answered the cry was the pneumatic tool. If you want to know anything about pneumatic tools read the advertising columns of the Review. All the great makers are with us more or less. They are intermittent advertisers. They ought to be constant. If the concern that you are looking for is not with us at the time you look, write to us and we will give you all necessary information.

The windlasses and capstans of the American Ship Windlass Co. and the Hyde Windlass Co. are known both in the United States and Europe. They deserve, indeed, to be known all over the world. Only a few issues of the Review appeared before these concerns were with us. They are still with us.

The B. F. Sturtevant Co., Boston, Mass., are consistent and intelligent advertisers. They make a great variety of things which a ship needs and during the course of the year they exploit them all in the Review. Their advertising should be watched, because it is always interesting.

Makers of furnaces, engines, boilers, ships, lathes, drills, planers, blowers, fans, lamps, search lights, packing, life rafts, belts, staybolts, bridges, sails, rivets, hoisting engines, propeller wheels, graphite, binoculars, anchors, pumps, paint, chains, capstans, steerers, valves, gauges, steel castings, shears, tubes, compasses, mattresses, machine tools of all sorts and anything and everything that a ship needs will be found in the advertising columns of the Marine Review.

The Review is, indeed, proud of its advertisers.

The success, or lack of success, of propeller wheels is largely attributable to the care, or lack of care, in fitting the conditions of each particular case. Especial attention is given that very important subject by the Marine Iron Works, station A, Chicago, resulting in their being in receipt of many orders for propeller wheels within their range of sizes (18 in. to 6 ft.), and in the speed, cruising or towing patterns, as may be required.

One cent a mile to Buffalo via the Nickel Plate Road, good going on July 2, 9, 16, 23 and 30, and returning within three days from date of sale. Write, wire, 'phone or call on nearest agent, or E. A. Akers, C. P. & T. A., Cleveland, O.

July 30

SUMMARY OF NAVAL CONSTRUCTION.

The monthly report of the bureau of construction and repair shows that vessels now building for the United States navy advanced about 2 per cent during July. Some delay in construction has been caused by the machinists' strike throughout the country. Following is the summary:

Name.	Building at	Degree of completion, Per cent.	
		June 1.	July 1.
BATTLESHIPS.			
Illinois	Newport News	94	96
Maine	Cramp & Sons	52	55
Missouri	Newport News	37	39
Ohio	Union Iron Works	43	43
Virginia	Newport News	0	0
Nebraska	Moran Bros. Co.	0	0
Georgia	Bath Iron Works	0	0
New Jersey	Fore River Co.	0	0
Rhode Island	Fore River Co.	0	0
ARMORED CRUISERS.			
Pennsylvania	Cramp & Sons	0	0
West Virginia	Newport News	0	0
California	Union Iron Works	0	0
Colorado	Cramp & Sons	0	2
Maryland	Newport News	0	0
South Dakota	Union Iron Works	0	0
SHEATHED PROTECTED CRUISERS.			
Denver	Neafie & Levy	47	49
Des Moines	Fore River Engine Co.	34	39
Chattanooga	Lewis Nixon	32	35
Galveston	Wm. R. Trigg Co.	27	31
Tacoma	Union Iron Works	20	20
Cleveland	Bath Iron Works	55	58
St. Louis	Neafie & Levy	0	0
Milwaukee	Union Iron Works	0	0
Charleston	Newport News	0	0
MONITORS.			
Arkansas	Newport News	57	60
Nevada	Bath Iron Works	87	89
Florida	Lewis Nixon	66	67
Wyoming	Union Iron Works	75	75
TORPEDO BOAT DESTROYERS.			
Bainbridge	Neafie & Levy	94	94
Barry	Neafie & Levy	88	88
Chauncey	Neafie & Levy	90	90
Dale	Wm. R. Trigg Co.	94	95
Decatur	Wm. R. Trigg Co.	96	96
Hopkins	Harlan & Hollingsworth	75	75
Hull	Harlan & Hollingsworth	74	74
Lawrence	Fore River Engine Co.	99	99
MacDonough	Fore River Engine Co.	98	98
Paul Jones	Union Iron Works	85	85
Perry	Union Iron Works	93	89?
Preble	Union Iron Works	92	87?
Stewart	Gas Engine & Power Co.	53	54
Truxton	Maryland Steel Co.	68	68
Whipple	Maryland Steel Co.	67	67
Worden	Maryland Steel Co.	67	67

TORPEDO BOATS.		
Stringham	Harlan & Hollingsworth	98
Goldsborough	Wolff & Zwicker	99
Biddle	Bath Iron Works	99
Blakely	Geo. Lawley & Son	98
DeLong	Geo. Lawley & Son	98
Nicholson	Lewis Nixon	89
O'Brien	Lewis Nixon	92
Thornton	Wm. R. Trigg Co.	97
Tingey	Columbian Iron Works	68
Wilkes	Gas Engine & Power Co.	80

SUBMARINE TORPEDO BOATS.		
Plunger	Lewis Nixon	10
Adder	Lewis Nixon	60
Grampus	Union Iron Works	51
Moccasin	Lewis Nixon	58
Pike	Union Iron Works	50
Porpoise	Lewis Nixon	55
Shark	Lewis Nixon	53

THAT FRENCH SUBMARINE PERFORMANCE.

Naval officials at Washington do not attach much importance to the report that a French submarine boat had managed to fasten a dummy torpedo to the bottom of a large battleship while the latter was at anchor. Discussing the subject Rear Admiral Melville, chief of the bureau of steam engineering, said:

"It would be possible to do just what the report says was done in this matter, but why should a battleship lie at anchor and allow a submarine boat to approach her at leisure? There was nothing shown in the test and it could easily have been done by a rowboat approaching silently at dark when no one was on lookout and sending a dummy sailing against the side of a battleship. I cannot see why any importance should be attached to the affair. While steaming at 8 or 9 knots it would not be practicable for a submarine to attach a torpedo to the bottom of a ship, but it might happen that a torpedo discharged under water from a submarine boat might be effective."

\$13.50 TO ATLANTIC CITY, N. J., AND RETURN.

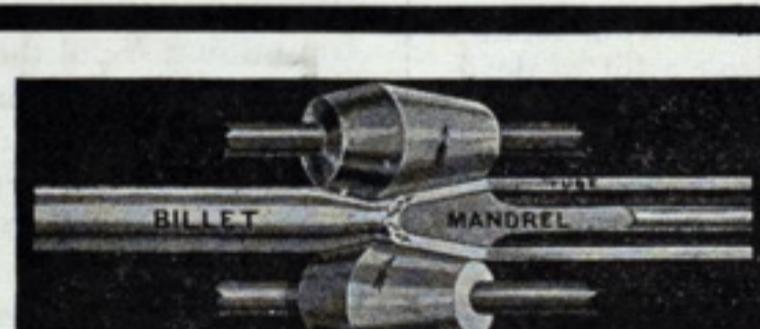
From any point on C. T. & V. R. R., July 18 and August 15. Tickets good twelve days and for return will admit of stop-over at Washington on return trip. Apply to any agent, or J. E. Galbraith, traffic manager, C. T. & V. R. R., Cleveland, O.

Aug. 8.

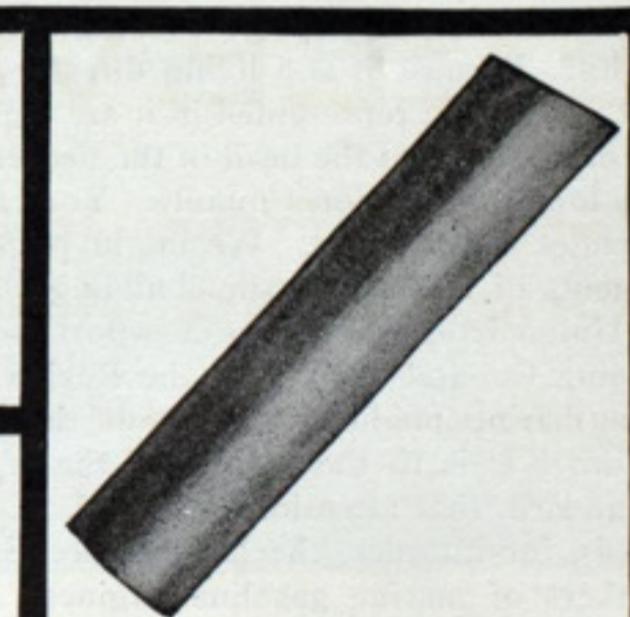
The plant of the Bath Iron Works, Bath, Me., was recently inspected by a board of naval officers consisting of Admiral H. C. Taylor, Lieut. A. J. Menocal, Naval Constructor Washington L. Capps, and Chief Engineer C. C. Wolcott. It was pronounced to be both compact and complete.



Electrolytic action on Brass Tubing which was taken out and replaced by "Benedict-Nickel."
—From a photograph.



Condenser Tubes
made from
"Benedict-Nickel"
resist Corrosion and the
destructive effect of
Electrolysis:



"Benedict-Nickel" Tubing in perfect condition after 28 months' service.
—From a photograph.

"Benedict-Nickel" Condenser Tubes are perfectly homogeneous and highly non-corrosive. They are rolled from solid cylindrical billets which contain absolutely no zinc nor any other weakening metal.

The illustration shows how "Benedict-Nickel" Condenser Tubes are made. The spiral formation given to the walls of the tubes increases their tensile strength 50% over brass, and makes them the toughest and strongest tubes manufactured.

Another advantage is that, owing to their extreme stiffness, they can be made of thinner gauge, and yet be stronger than the thicker brass or copper tubes of the same diameter. The economical feature will therefore be readily understood.

A treatise on "Electrolysis of Condenser Tubes" mailed upon request.

We are also among the largest manufacturers of Seamless Brass and Copper Tubing, and the ONLY manufacturer in the United States of this tubing rolled spirally from a solid billet. This is the process used in the manufacture of "Benedict-Nickel."

BENEDICT & BURNHAM MFG. CO.,

MILLS AND MAIN OFFICES, WATERBURY, CONN.

DEPOTS: NEW YORK, 253 Broadway.

BOSTON, 172 High Street.

V. WARING, N.Y.

PRODUCTION AND PRICES OF STEEL RAILS.

The following from the Bulletin of the American Iron & Steel Association table gives the annual production in gross tons of Bessemer steel rails in the United States from 1867 to 1900, together with their average annual price at works in Pennsylvania and the rates of duty imposed on foreign rails:

Calendar years	Production in gross tons.	Price in currency.	Duty.
1867.....	2,277	\$166.00	
1868.....	6,451	158.50	{ 45 per cent. ad valorem
1869.....	8,616	132.25	to Jan. 1, 1871.
1870.....	30,357	106.75	
1871.....	34,152	102.50	
1872.....	83,991	112.00	
1873.....	115,192	120.50	
1874.....	129,414	94.25	\$28 per ton from Jan 1,
1875.....	259,699	68.75	1871, to Aug. 1, 1872;
1876.....	368,269	59.25	\$25.20 from Aug. 1,
1877.....	385,865	45.50	1872, to March 3, 1875;
1878.....	491,427	42.25	\$28 from March 3,
1879.....	610,682	48.25	1875, to July 1, 1883.
1880.....	852,196	67.50	
1881.....	1,187,770	61.13	
1882.....	1,284,067	48.50	
1883.....	1,148,709	37.75	
1884.....	996,983	30.75	
1885.....	959,471	28.50	
1886.....	1,574,703	34.50	\$17 per ton from July 1,
1887.....	2,101,904	37.08	1883, to Oct. 6, 1890.
1888.....	1,386,277	29.83	
1889.....	1,510,057	29.25	
1890.....	1,867,837	31.75	
1891.....	1,293,053	29.92	\$13.44 from Oct. 6, 1890,
1892.....	1,537,588	30.00	to Aug. 28, 1894.
1893.....	1,129,400	28.12	
1894.....	1,016,013	24.00	
1895.....	1,299,628	24.33	
1896.....	1,116,958	28.00	
1897.....	1,644,520	18.75	\$7.84 from Aug. 28, 1894,
1898.....	1,976,702	17.62	to July, 1901.
1899.....	2,270,585	28.12	
1900.....	2,361,921*	32.29	

*These figures are not final and will be increased.

The lowest average annual price at which Bessemer steel rails have been sold in this country was reached in 1898, namely, \$17.62 per ton, but sales were made at Pittsburg in 1897 and 1898 at \$17, and perhaps at even lower figures.

ITEMS OF GENERAL INTEREST.

A handsome model of the Cleveland class of cruisers has been set up in the corridor of the navy building at Washington.

The Chase Machine Co. of Cleveland recently shipped to Fairport a steam hoisting engine of novel design as part of the installation of a rapid fueling plant.

The torpedo boat destroyer Stringham has left for Newport, R. I., where she is to have another trial trip. She is in charge of a special crew and representatives of the Harlan & Hollingsworth Co.

Recent trials of Shamrock II have demonstrated that the yacht is in several respects superior to Shamrock I. In moderately light weather Shamrock II is between five and ten minutes faster than Shamrock I on a windward and leeward thirty mile course. She works very fast to windward.

The biggest raft of logs ever towed on Lake Superior reached Duluth last week. It was supposed to contain somewhere between 7,500,000 and 8,000,000 ft. It was moved from Pigeon river, 180 miles down the north shore, and made the trip in eight days, an average speed of about a mile an hour. The raft reached Duluth without loss and was towed to Alger, Smith & Co.'s mill.

North German Lloyd steamship officials announce that they have contracted for the construction of six new passenger and freight steamers. The names of the steamers and their builders are as follows: Gneisenau and Schleswig, to be built by the Vulcan Ship Building Co., at Stettin; Roon and Scharnhorst, to be built by J. C. Teckleborg at Geestemunde; Zeiten and Seydlitz, to be built by F. Schichau at Danzig, Germany. They will be twin-screws and will be of about 8,000 tons register.

The course of practical instruction in several branches of the naval service, which has been adopted by the navy department for the benefit of naval apprentices, has been extended in another direction, the handling of torpedo boats. The first step toward training apprentices to handle these little ships of war has been taken in the issue of orders to Lieut. Lloyd H. Chandler, an experienced young officer attached to the bureau of ordnance, to take command of the torpedo boat Bailey. The Bailey will be used as a practice vessel for the apprentices at the Newport training station and it will be the duty of Lieut. Chandler to instruct these apprentices in the proper handling of this delicate craft, with particular application to the duties of a torpedo boat in operation against a hostile ship or division of ships.

To Buffalo and return, \$3.70, every Tuesday and Saturday until recalled. Good returning within three days on any regular train, including train leaving Buffalo at 1.00 (central time) or 2.00 (eastern time) after midnight of the third day from date of sale. For specific information call on E. A. Akers, C. P. & T. A., 189 Superior St., Tel. Main 218, Cleveland, Ohio.

135, Aug. 16

BELLEVILLE GENERATORS

**Grand Prix 1889
Originated 1849**

**Hors Concours 1900
Latest Improvements 1896**

Number of Nautical Miles made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australien	Polynésien	Armand Béhic	Ville de la Ciotat	Ernest Simons	Chili	Cordillère	Laos	Indus	Tonkin	Annam	Atlantique
1890.....	67,728	2,460										
1891.....	68,247	68,331	204									
1892.....	68,247	68,403	69,822	23,259								
1893.....	68,379	68,343	68,286	68,247								
1894.....	68,439	68,367	68,574	68,439	37,701							
1895.....	68,673	68,766	68,739	68,808	40,887	28,713						
1896.....	69,534	92,718	69,696	69,549	62,205	63,153	40,716					
1897.....	68,250	69,606	92,736	69,555	62,235	76,110	63,357	43,146				
1898.....	70,938	69,534	69,552	69,597	62,526	63,240	63,240	62,553	63,954	22,707		
1899.....	69,534	69,615	67,431	90,405	60,246	62,778	62,868	52,344	54,855	44,007	22,884	
1900.....	69,534	67,494	69,744	69,564	61,719	62,382	62,502	51,471	53,373	62,016	63,066	52,140
Total.....	757,503	713,637	644,784	597,423	387,519	356,376	292,683	209,514	172,182	128,730	85,950	52,140

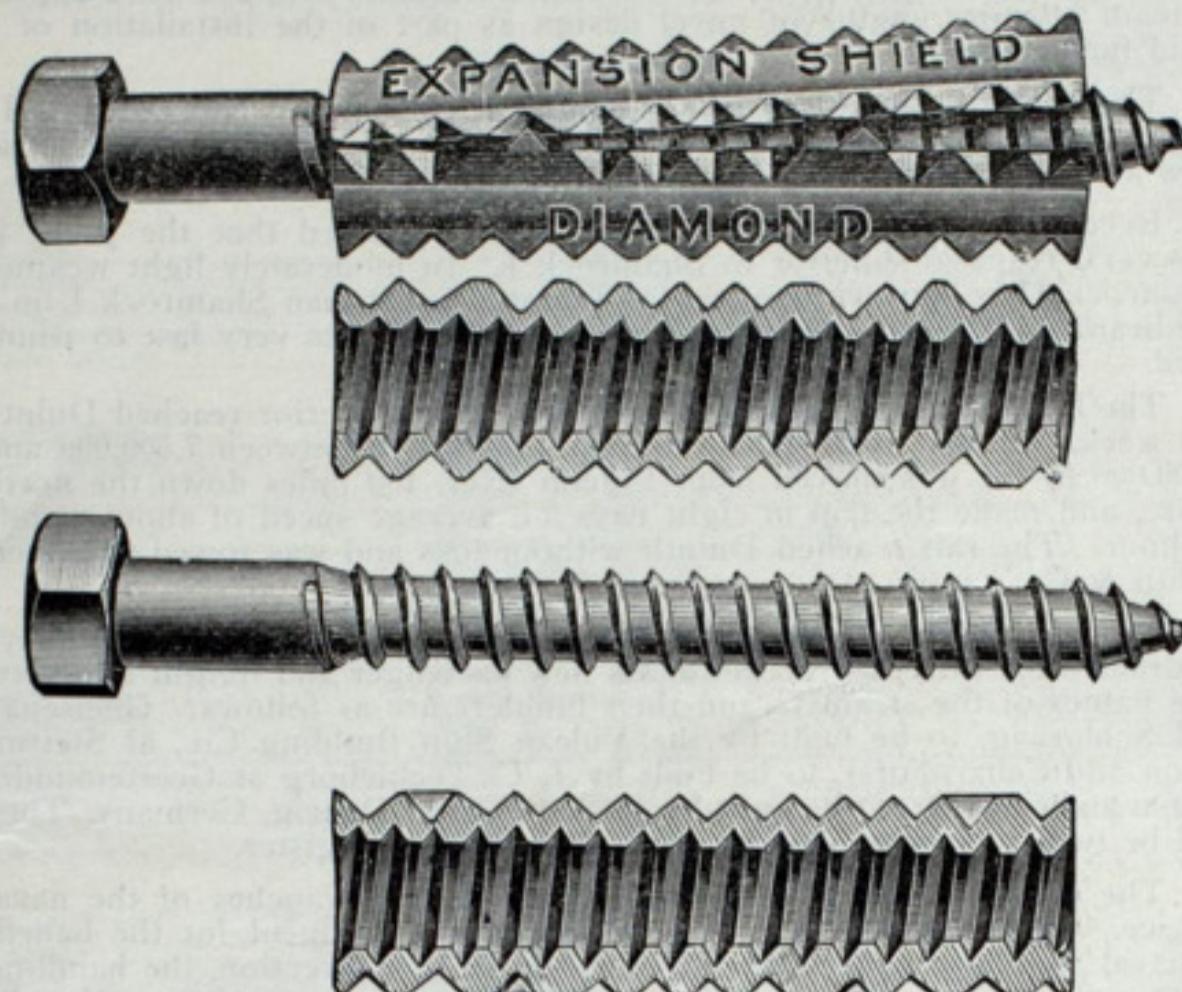
ATELIERS ET CHANTIERS DE L'ERMITAGE, À ST. DENIS (SEINE), FRANCE.

WORKS AND YARDS OF L'ERMITAGE AT ST. DENIS (SEINE), FRANCE.

TELEGRAPHIC ADDRESS · BELLEVILLE, SAINT-DENIS-SUR-SEINE.

DIAMOND EXPANSION BOLT AND SHIELD.

The United States government has used 7,000 diamond expansion bolts recently for attaching fenders to brick columns in the new building for the government printing office at Washington, D. C. Those engaged



in the many branches of building work requiring the use of expansion bolts will be interested in the diamond expansion bolt shown below, which is the first radical departure from the usual crude method of fastening

BURNISHINE.

THE MOST MARVELOUS METAL POLISH IN THE WORLD.

In Liquid and Paste Form.



Will Polish Hot or Cold Metal, no matter which.

Produces a wonderfully brilliant lustre on brass, copper, nickel and all metals, no labor required.

Used on steamers all over the world. Free samples on application.

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57 Dearborn St., CHICAGO, ILL.

It is up to you Mr. Engineer.

We have shown you time and again in the advertising pages of the leading engineering journals that we are the manufacturers of

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Boston. Pittsburgh. Denver.
Chicago. Cleveland. San Francisco.

MAIN OFFICES AND FACTORIES:
PALMYRA, N. Y.; ROME, GA.

material to stone and concrete. This bolt, or shield, can be placed back in the wall to the second, third or fourth row of bricks without the use of a pipe sleeve being placed between the shield and the edge of the wall. This is due to the fact that the diamond expansion shield expands when the screw is turned into it and does not require any outside pressure, as is the case with other bolts.

This bolt produces a direct expansion from the screw to the shield, which occurs as soon as the screw is started and continues until the greatest expansion is produced at the farther end of the shield. As the illustrations show, the greatest expansion is at the inner end of the bolt, and from that point the expansion is reduced until at the outer end of the hole no expansion at all occurs. This prevents any possibility of cracking the surface of the masonry to which the bolt is attached. When the screw is entirely inserted and the head is drawn tight against the material to be fastened, the tendency is to draw the shields out of the hole, but the greater the strain in this direction the tighter the shields grip into the masonry. The roughened surfaces of the shields with their diamond shaped projections secure a hold in the masonry which cannot be loosened by the great amount of vibration to which these bolts are sometimes subjected. Another advantage claimed for the diamond expansion bolt is that the standard size of shield can be used with any length of lag screw, so that when the thickness of materials to be fastened varies, the length of the

lag screws can be varied accordingly and used with the same sized shields.

Hardware and supply dealers find it a great advantage to order the shields only and to make up their own expansion bolts of any length by using standard G. P. lag screws or wood screws which they have on hand. In this way with a very small outlay they can carry a supply of the different diameters of shields and furnish any size expansion bolt that may be called for, whereas, with other expansion bolts they would have to carry a very large stock to cover all the different sizes required from time to time. The diamond expansion bolt is made by the New Jersey Foundry & Machine Co., No. 26 Courtlandt street, New York City.

"Seaboard Steel Castings."

MANUFACTURERS OF
"THE ADMIRAL" ANCHOR.

THE LATEST AND BEST STOCKLESS ANCHOR.
APPROVED BY LLOYD'S.

ANCHORS CAST AND TESTED ON ORDER, OR STOCK ORDERS PROMPTLY FILLED.

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OPEN-HEARTH STEEL CASTINGS OF THE HIGHEST GRADE.
FACILITIES FOR CASTINGS UP TO 80,000 POUNDS WEIGHT.

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RAIL OR WATER DELIVERIES.

CAPACITY, 1500 TONS PER MONTH

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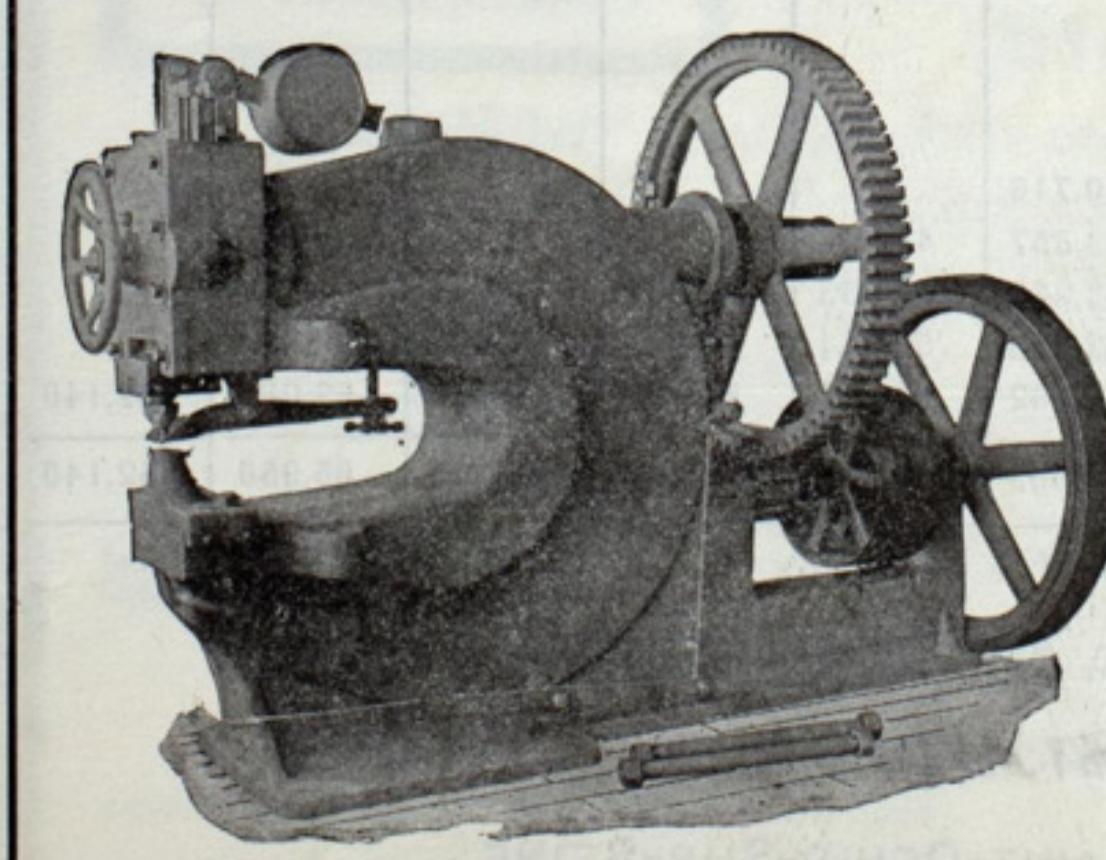
THIS ILLUSTRATES OUR

Standard Boiler Maker's Punch

which is similar to our iron worker's punch with the exception that it is equipped with a plain jaw instead of an architectural jaw. We believe that this is the best punch for boiler makers on the market to-day, and for strength, reliability, and beauty of design we think it is unequalled. We can refer you to hundreds of the largest shops all over the world where we have installed one or more of these tools, and where they are giving the best of satisfaction and service.

Let us hear from you if you are in the market for a tool of this kind. We think we can interest you both as regards quality and price.

THE CLEVELAND PUNCH SHEAR WORKS CO.,
CLEVELAND, O., U. S. A.



VENTILATION AND HEATING.

"In considering the introduction of a special engine for driving the fan of a heating apparatus in connection with the blower system of ventilation and heating," says a note from the B. F. Sturtevant Co. of Boston, "it should be clearly realized that a certain amount of steam being required for supply to the heater, the passage of that steam through the engine on its way to the heater entails very little loss in its heating power—so little, in fact, that the actual expense of driving the fan may be disregarded and the steam-engine cylinder may be looked upon as merely an enlargement of the steam pipe. Evidently this feature of this system has its influence on the relative cost of driving the fan by engine, or by electric motor, for, in the employment of the latter there is no incidental return whereby the cost of power is reduced."

A third edition of the booklet, Bulletin J, relating to "Mechanical Draft; What it is and What it Does," has just been issued by the Sturtevant company, of whom it can be obtained on application. It illustrates applications under both the forced and induced methods and shows the Sturtevant blower works as they now appear without a chimney—a fan being employed exclusively for producing the required draft for about 400 boiler horse power.

Oh, ye puzzled British parents who have progeny to plant,
And are looking for a suitable career
For the soaring human youngsters—here's the very thing you want,
And you will not get a better far or near.
All the trades are torn to tatters, all professions run to seed,
And it's very hard to earn an honest meal;
If you want your boys to flourish in the by-and-by you'll need
To encourage them to study Yankee steel.—Glasgow Evening News.

In the ordnance building at the Pan-American exposition is a collection of paintings of vessels designed by Mr. Horace See of No. 1 Broadway, New York City, and also a painting of the steamer Monmouth, the machinery of which was designed by Mr. See and built under his superintendence. The exhibit also includes one of the See ash ejectors, of which over 800 are in operation both on land and sea.

A British admiralty chart, Midland section of Georgian bay, will be sent, postpaid, to any address for \$1.25; regular price \$1.75. Size of sheet 3x4 ft. The Marine Review Pub. Co., Perry-Payne building, Cleveland. Chart of the whole bay on one sheet at the same price.

First excursion to Atlantic City via B. & O. R. R. July 18, \$13.50 round trip. Secure tickets in advance, city ticket office, 241 Superior st., Cleveland. July 18.

Low rates to Chicago via B. & O. R. R. July 24, 25 and 26. \$8.50 round trip. City ticket office, 241 Superior street, Cleveland. July 25

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NEW YORK CITY.

U. S. Engineer Office, 57 Park St., Grand Rapids, Mich., June 26, 1901. Sealed proposals for Repair of Piers at Manistee, Mich., will be received here until 3 p. m., July 26, 1901, and then publicly opened. Information furnished on application. Charles Keller, Capt., Engrs. July 18.

FOR SALE.

BALANCED COMPOUND MARINE ENGINES carried in stock for immediate delivery—20 to 200 horse power. Full line of patterns for larger sizes and quadruple expansion engines, insuring quick delivery Highest economy and speed.

NO VIBRATION. Contracts taken for complete plants.

July 25. **WELLS ENGINEERING CO., 136 Liberty St., NEW YORK, N. Y.**

AN OPPORTUNITY—MARINE ENGINE.

The undersigned have for sale, in good condition, a second-hand Wells' Balanced Quadruple Expansion Engine. Size 8 in., 12 in., 16 in. and 24 in. by 18 in. stroke. Price \$1,000. Full description upon application. Fore River Ship & Engine Co., Quincy, Mass. July 18.

TUG FOR SALE.

Wood hull 61 ft. long, 14 ft. 8 in. beam. Iron house. Engine 16 $\frac{1}{4}$ by 18 in. Boiler pressure allowed, 140 lbs. Price \$2600. Inquire C. H. Strong & Son, No. 622 Cuyahoga building, Cleveland, O. July 25.

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MANUFACTURERS OF

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Stay Tubes,
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High Steam Pressures.

Boiler Tubes
FOR ALL CLASSES
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If you are using a different water, prepay the express on a gallon jug of your feed water to the DEARBORN LABORATORIES at CHICAGO and receive a copy of analysis of same, with a written diagnosis of your case, and a letter giving you all the valuable information we can, and the actual cost of what it will require to clean your boilers and keep them clean. All of this will be done free of charge, and optional with you whether you order or not. When in Chicago call and inspect our Laboratories.

Analyzers of Everything.

Makers of Boiler Compounds.

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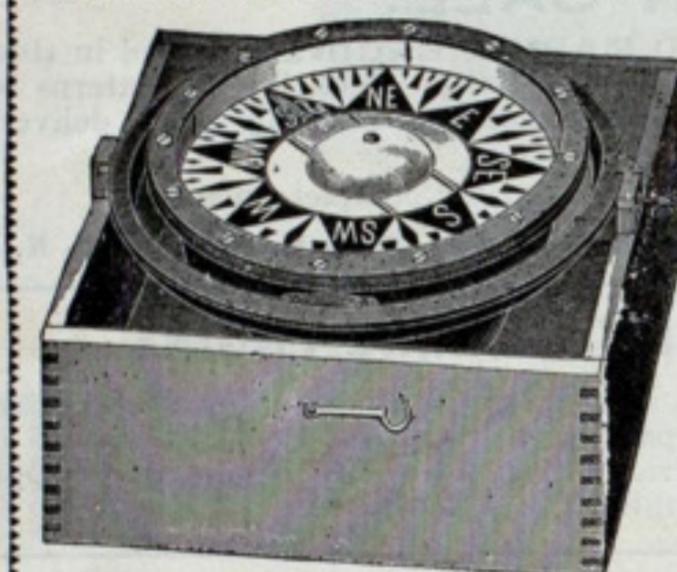
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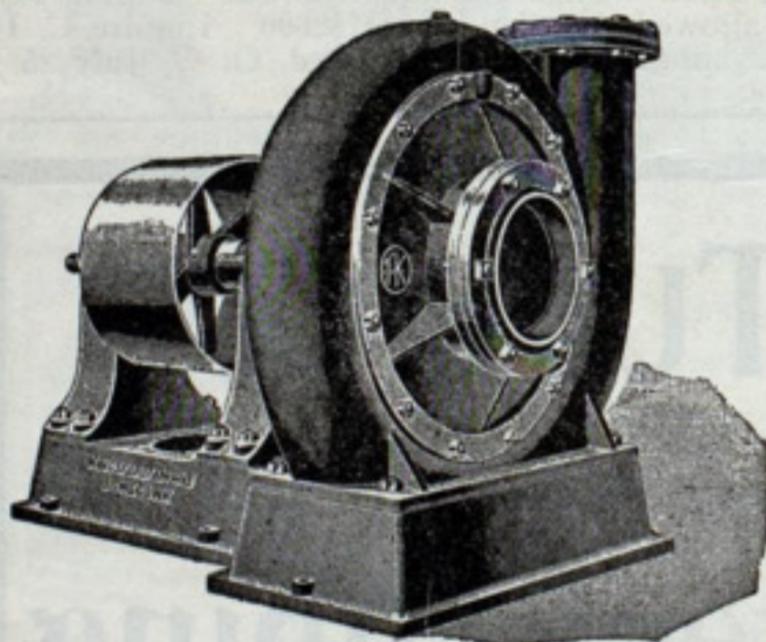


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WARWICK SHIP DRIVING IRON,
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DAVITS, SHACKLES, SWIVELS
AND OTHER FORGINGS, CLOSE
LINK AND STUD LINK YACHT
AND SHIP CABLES, ANCHORS,
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KEEP YOUR BOILERS CLEAN

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The "BUFFALO" is Warranted to Remove all Sediment and
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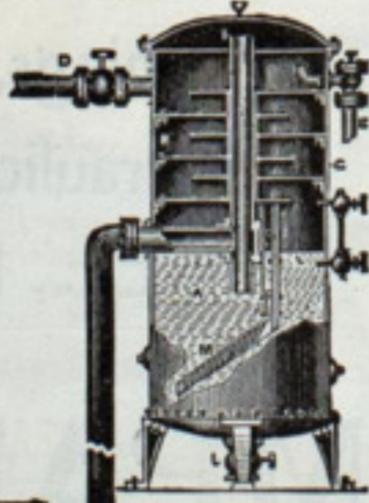
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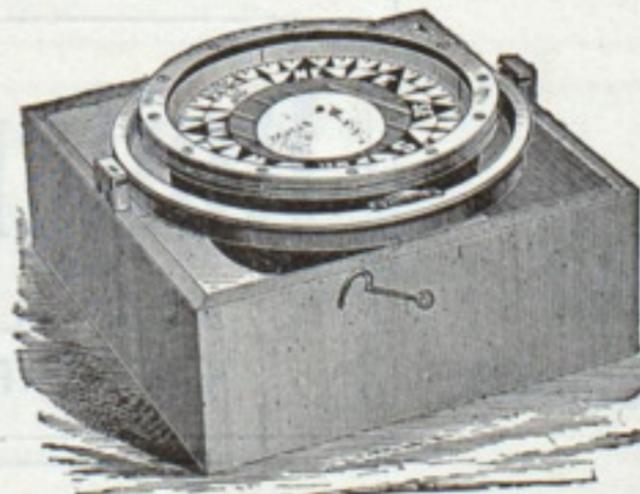


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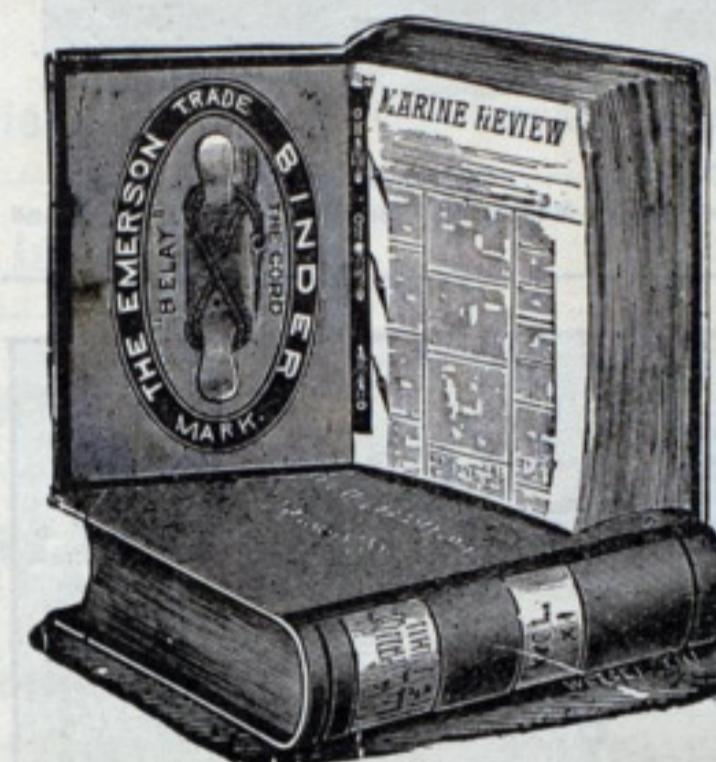
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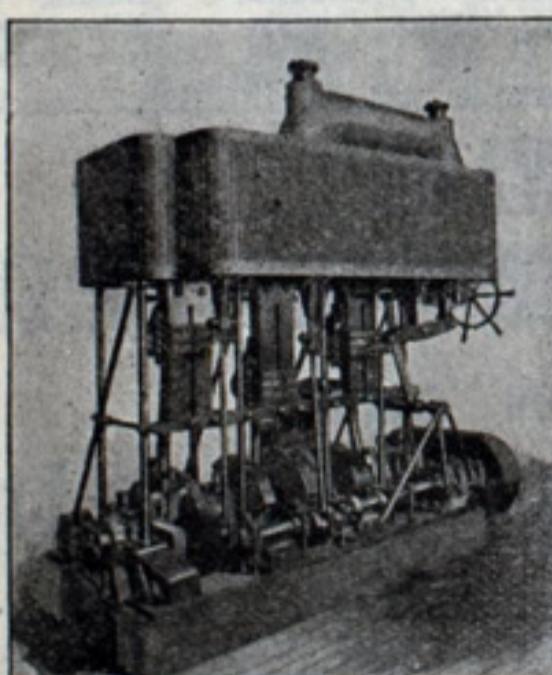
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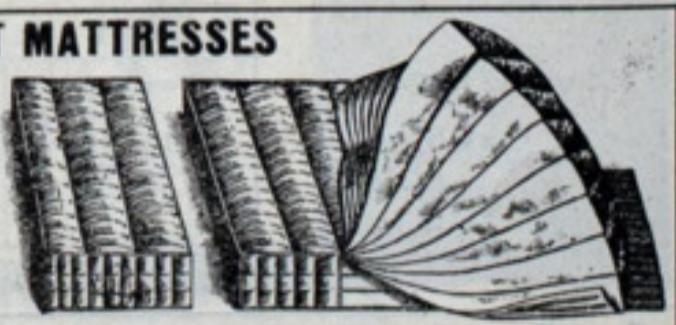
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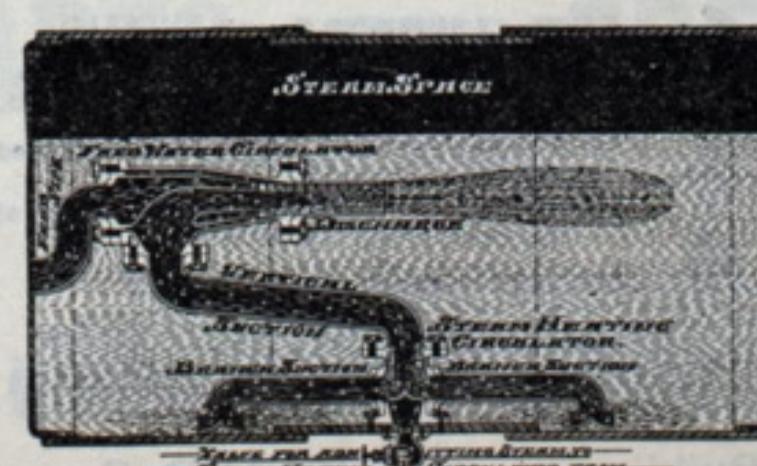
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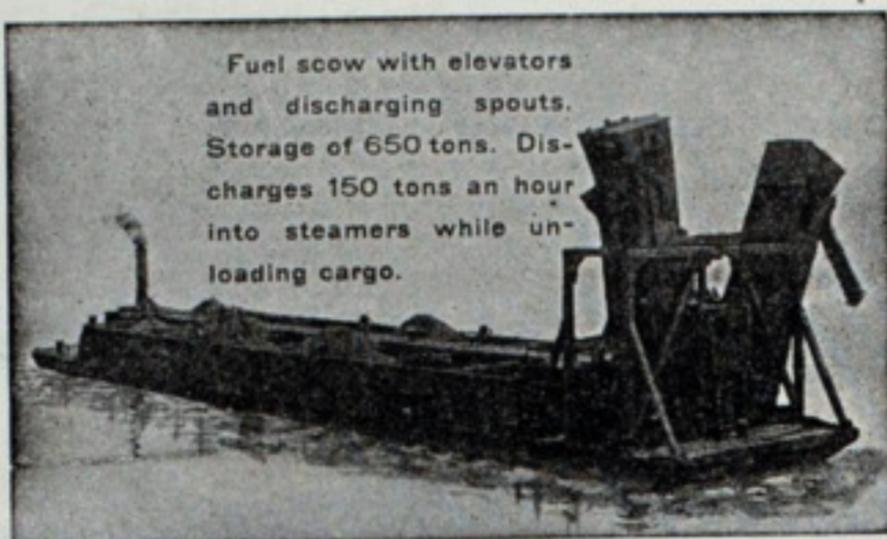
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TELEGRAPH
Capt. MARTIN SWAIN,
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1 COAL AND ORE PUMP
3-12 INCH ROTARY.
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DIVING RIGS
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ABOARD
ALL TIMES.

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MODERN SEAMANSHIP.

By AUSTIN M. KNIGHT, Lieutenant-Commander, United States Navy.

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- Chapter III. Spars and Standing Rigging.
- Chapter IV. Sails and Running Gear.
- Chapter V. Mechanical Appliances on Shipboard.
- Chapter VI. Blocks and Tackles.
- Chapter VII. Handling Heavy Weights.
- Chapter VIII. The Compass, Log, and Lead.
- Chapter IX. Boats.
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- Chapter XI. Ground Tackle.
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- Chapter XXIV. Stranding.
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Buffalo Forge Co. Buffalo.
Detroit Shipbuilding Co. Detroit.
Sturtevant, B. F. Co. Boston.

ATTORNEYS AND PROCTORS IN ADMIRALTY.
Gilchrist, Albert J. Cleveland.
Goulder, Holding & Masten. Cleveland.
Hoyt, Dustin & Kelley. Cleveland.
MacDonald, Ray G. Chicago.
Pinney, Orestes C. Cleveland.
Stowe & Graydon. Chicago.
White, Johnson, McCaslin & Cannon. Cleveland.

BAROMETERS, MARINE GLASSES, ETC.

Bliss, John & Co. New York.
Goerz, C. P. New York.
Ritchie, E. S. & Sons. Brookline, Mass.

BENDING AND STRAIGHTENING ROLLS.

Bement, Miles & Co. Philadelphia.
Cleveland Punch & Shear Works Co. Cleveland.
Niles Tool Works Co. Hamilton, O.
Wood & Co., R. D. Philadelphia.

BERTHS, BUNKS, BEDS.

Lein, Irvine & Co. New York.

BLOCKS, SHEAVES, ETC.

Boston & Lockport Block Co. Boston, Mass.
Cleveland Block Co. Cleveland.

BLOWERS.

American Blower Co. Detroit.
Boston Blower Co. Hyde Park, Mass.
Buffalo Forge Co. Buffalo.
Sturtevant, B. F. Co. Boston.

BOAT NAILS AND SPIKES.

American Steel & Wire Co. Chicago.

BOAT BUILDERS.

Drein, Thos. & Son. Wilmington, Del.
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated. New York.
Kahnweiler's Sons, David. New York.
Lane & DeGroot. Brooklyn.
Willard, Chas. P. & Co. Chicago.

BOILER MANUFACTURERS.

Almy Water Tube Boiler Co. Providence, R. I.
American Ship Building Co. Cleveland.
Atlantic Works. East Boston, Mass.
Babcock & Wilcox Co. New York.
Bath Iron Works, Ltd. Bath, Me.
Boyer Water Tube Boiler Co. New York.
Chicago Ship Building Co. Chicago.
Cramp, Wm. & Sons. Philadelphia.
Delaunay, Belleville & Co. St. Denis, France.
Detroit Shipbuilding Co. Detroit.
Farrar & Trefts. Buffalo.
Fletcher, W. & A. Co. Hoboken, N. J.
Fore River Ship & Engine Co. Quincy, Mass.
Gas Engine & Power Co. Morris Heights, N. Y.
Hardy, John B. Tacoma, Wash.
Harlan & Hollingsworth Co. Wilmington, Del.
Hodge, S. F. & Co. Detroit.
Jenks Ship Building Co. Port Huron, Mich.
Kingsford Foundry & Machine Works. Oswego, N. Y.
MacKinnon Mfg. Co. Bay City, Mich.
Maryland Steel Co. Sparrow's Point, Md.
Moran Bros. Co. Seattle, Wash.
Neafie & Levy Ship & Engine Building Co. Philadelphia.
Newport News Ship Building Co. Newport News, Va.
Nixon, Lewis. Elizabeth, N. J.
Pusey & Jones Co. Wilmington, Del.
Risdon Iron Works. San Francisco.
Roberts Safety Water Tube Boiler Co. New York.
Stirling, The Co. Chicago.
Taylor Boiler Co. Detroit.
Trigg, Wm. R. Co. Richmond, Va.
Union Iron Works. San Francisco.
Willard, Chas. P. & Co. Chicago.

BOILER COMPOUNDS.

Dearborn Drug & Chemical Works. Chicago.

BOILER FURNACES, FIRE FRONTS, ETC.

Continental Iron Works. New York.

BOILER RIVETS.

Bourne-Fuller Co. Cleveland.
Champion Rivet Co. Cleveland.

BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.

Falls Hollow Staybolt Co. Cuyahoga Falls, O.

BOLT CUTTERS.

Bement, Miles & Co. Philadelphia.
Niles Tool Works Co. Hamilton, O.

BORING AND TURNING MILLS.

Bement, Miles & Co. Philadelphia.
Niles Tool Works Co. Hamilton, O.

BRASS AND BRONZE CASTINGS.

Cramp, Wm. & Sons. Philadelphia.
Fore River Ship & Engine Co. Quincy, Mass.
Illinois Smelting & Refining Works. Chicago.
Phosphor Bronze Smelting Co. Philadelphia.

BRIDGES, BUILDERS OF.

Scherzer Rolling Lift Bridge Co. Chicago.

BUCKETS, ORE AND COAL.

Brown Hoisting & Conveying Machine Co. Cleveland.
McMyler Mfg. Co. Cleveland.

CABIN AND CABINET FINISHING WOODS.

Martin-Barriss Co. Cleveland.

CAPSTANS.

American Ship Windlass Co. Providence, R. I.
Hyde Windlass Co. Bath, Me.

CHAINS.

Monongahela Iron & Steel Co. Pittsburgh.
Newhall Chain Forge & Iron Co. New York.
Standard Chain Co. Pittsburgh.

CHAIN HOISTS.

Boston & Lockport Block Co. Boston, Mass.

CHUCKING MACHINES.

Bement, Miles & Co. Philadelphia.
Niles Tool Works Co. Hamilton, O.

CHUCKS FOR LATHES, DRILLS AND PLANERS.

Skinner Chuck Co. New Britain, Conn.

CIRCULATOR, EQUILIBRIUM, with Steam Heating Attachment.

Bloomsburg & Co., H. Newport News, Va.

CLOCKS (Marine), CHRONOMETERS, BELLS.

Ashton Valve Co. Boston.
Bliss, John & Co. New York.
Ritchie, E. S. & Sons. Brookline, Mass.

COAL PRODUCERS AND SHIPPERS.

Castner, Curran & Bullitt. Philadelphia.
Hanna, M. A. & Co. Cleveland.
Ohio Fuel Co. Cleveland.
Pickands, Mather & Co. Cleveland.
Pittsburg Coal Co. Cleveland.
Rochester & Pittsburgh Coal & Iron Co. Buffalo.
Scott Co., The W. L. Erie, Pa.

COAL AND ORE HANDLING MACHINERY.

Brown Hoisting Machinery Co., Incorporated. Cleveland.
Lidgerwood Mfg. Co. New York.

COMPASSES.

Bliss, John & Co. New York.
Ritchie, E. S. & Sons. Brookline, Mass.

COMPASS ADJUSTER.

Fields, J. M. Cleveland.

CORK JACKETS AND RINGS.

Armstrong Cork Co. Pittsburgh, Pa.
Kahnweiler's Sons, D. New York.
Lane & DeGroot. Brooklyn.

CRANES, CONVEYORS, HOISTS.

Brown Hoisting Machinery Co., Incorporated. Cleveland.
General Electric Co. Schenectady, N. Y.
Lidgerwood Mfg. Co. New York.
Niles Tool Works Co. Hamilton, O.
Westinghouse Electric & Mfg. Co. Pittsburgh.
Wood & Co., R. D. Philadelphia.

CRANK PINS.

Cleveland City Forge & Iron Co. Cleveland.

DIVING APPARATUS.

Hale Rubber Co., Alfred. So. Boston, Mass.

DOORS—PNEUMATIC AND ELECTRIC SAFETY POWER DOORS AND HATCHES.

"Long Arm" System Co. Cleveland.

DRILL PRESSES—DRILLS OF ALL KINDS.

Bement, Miles & Co. Philadelphia.
Cleveland Punch & Shear Works Co. Cleveland.
Niles Tool Works Co. Hamilton, O.
Pond Machine Tool Co. Plainfield, N. J.
Pratt & Whitney Co. Hartford, Conn.

DRILLS, PNEUMATIC.

Standard Pneumatic Tool Co. Chicago.

DRYING APPARATUS.

American Blower Co. Detroit.
Boston Blower Co. Hyde Park, Mass.
Sturtevant, B. F. Co. Boston.

DRY DOCKS.

American Ship Building Co. Cleveland.
Bath Iron Works, Ltd. Bath, Me.
Buffalo Dry Dock Co. Buffalo.
Chicago Ship Building Co. Chicago.
Craig Ship Building Co. Toledo, O.
Cramp, Wm. & Sons. Philadelphia.
Detroit Shipbuilding Co. Detroit.
Harlan & Hollingsworth Co. Wilmington, Del.
Lockwood Mfg. Co. East Boston, Mass.
Maryland Steel Co. Sparrow's Point, Md.

Moran Bros. Co. Seattle, Wash.
Newport News Ship Building Co. Newport News, Va.
Nixon, Lewis. Elizabeth, N. J.
Pusey & Jones Co. Wilmington, Del.
Shipowners Dry Dock Co. Chicago.
Union Iron Works. San Francisco.

ELECTRIC AUTOMATIC WHISTLE OPERATORS.

Signal & Control Co. New York.

ELECTRIC LIGHT AND POWER PLANTS.

Buffalo Forge Co. Buffalo.
Electro-Dynamic Co. Philadelphia.
Elwell-Parker Electric Co. Cleveland.
General Electric Co. Schenectady, N. Y.
Seidler-Miner Electric Co. Detroit.
Sturtevant, B. F. Co. Boston.
Westinghouse Electric & Mfg. Co. Pittsburgh, Pa.

ELECTRIC HOISTS AND CRANES.

Elwell-Parker Electric Co. Cleveland.
General Electric Co. Schenectady, N. Y.
Lidgerwood Mfg. Co. New York.
Westinghouse Electric & Mfg. Co. Pittsburgh, Pa.

ELECTRIC STEERING GEAR, SPEED AND RUDDER INDICATORS, ETC.

Electro-Dynamic Co. Philadelphia.

ENGINE BUILDERS, MARINE.

American Ship Building Co. Cleveland.
Atlantic Works. East Boston, Mass.
Bath Iron Works, Ltd. Bath, Me.
Chicago Ship Building Co. Chicago.
Chase Machine Co. Cleveland.
Craig Ship Building Co. Toledo, O.
Cramp, Wm. & Sons. Philadelphia.
Detroit Shipbuilding Co. Detroit.
Farrar & Trefts. Buffalo.
Fletcher, W. & A. Co. Hoboken, N. J.
Fore River Ship & Engine Co. Quincy, Mass.
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated. New York.
Hardy, John B. Tacoma, Wash.
Harlan & Hollingsworth Co. Wilmington, Del.
Hodge, S. F. & Co. Detroit.
Jenks Ship Building Co. Port Huron, Mich.
Lake Shore Engine Works. Marquette, Mich.
Lockwood Mfg. Co. East Boston, Mass.
MacKinnon Mfg. Co. Bay City, Mich.
Maryland Steel Co. Sparrow's Point, Md.
Moran Bros. Co. Seattle, Wash.
Neafie & Levy Ship & Engine Bldg. Co. Philadelphia.
Newport News Ship Building Co. Newport News, Va.
Nixon, Lewis. Elizabeth, N. J.
Olds Motor Works. Detroit.
Pusey & Jones Co. Wilmington, Del.
Risdon Iron Works. San Francisco.
Roach's Ship Yard. Chester, Pa.
Sheriffs Mfg. Co. Milwaukee.
Trigg, Wm. R. Co. Richmond, Va.
Trout, H. G. Buffalo.
Union Iron Works. San Francisco.
Willard, Chas. P. & Co. Chicago.

ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.

Cory, Chas. & Son. New York.
Electro-Dynamic Co. Philadelphia.
Seidler-Miner Electric Co. Detroit.

ENGINEERING SPECIALTIES AND SUPPLIES.

Crane Co. Chicago.
Reilly Repair & Supply Co., James. New York.

ENGINEERS, MARINE AND MECHANICAL.

Electro-Dynamic Co. Philadelphia.
Gaskin, Edward. Buffalo.
Hunt, Robt. W. & Co. Chicago.
Miller, Walter. Cleveland.
Pittsburgh Testing Laboratory, Ltd. Pittsburgh.
Powell, Ambrose V. Chicago.
See, Horace. New York.
Wood, W. J. Chicago.

EVAPORATING AND DISTILLING APPARATUS.

Reilly Repair & Supply Co., James. New York.

FANS FOR VENTILATION, EXHAUST, ETC.

American Blower Co. Detroit.
Boston Blower Co. Hyde Park, Mass.
Buffalo Forge Co. Buffalo.
Sturtevant, B. F. Co. Boston.

FEED WATER PURIFIERS AND HEATERS.

Learmonth, Robert. Buffalo.
Reilly Repair & Supply Co., James. New York.
Reynolds, H. J. Cleveland.

FIRE EXTINGUISHING APPARATUS.

Clayton Fire Extinguishing & Disinfecting Co. New York.

FIXTURES FOR LAMPS, OIL AND ELECTRIC.

Page Bros. & Co. Boston.
Porter's Sons

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

FURNACES FOR BOILERS.

Continental Iron Works.....	New York.
FUELING COMPANIES AND COAL DEALERS.	
Castner, Curran & Bullitt (Pocahontas).....	Philadelphia.
Hanna, M. A. & Co.....	Cleveland.
Ohio Fuel Co.....	Cleveland.
Pickands, Mather & Co.....	Cleveland.
Pittsburg Coal Co.....	Cleveland.
Rochester & Pittsburgh Coal & Iron Co.....	Buffalo.
Scott Co., The W. L.....	Erie, Pa.
Smith, Stanley B. & Co.....	Detroit.
Youghiogheny & Lehigh Coal Co.....	Chicago.

GAS BUOYS.

Safety Car Heating & Lighting Co.....	New York.
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GAS AND GASOLINE ENGINES.

Chase Machine Co.....	Cleveland.
Lake Shore Engine Works.....	Marquette, Mich.
Olds Motor Works.....	Detroit.

GAGES, STEAM AND VACUUM.

American Steam Gauge Co.....	Boston.
Ashton Valve Co.....	Boston.
Crosby Steam Gage & Valve Co.....	Boston.

GRAPHITE.

Dixon Crucible Co., Joseph.....	Jersey City, N. J.
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GRAPHITE BUSHINGS AND BEARINGS.

Graphite Lubricating Co.....	Bound Brook, N. J.
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HAMMERS, PNEUMATIC.

Standard Pneumatic Tool Co.....	Chicago.
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HAMMERS, STEAM.

Bement, Miles & Co.....	Philadelphia.
Chase Machine Co.....	Cleveland.
Niles Tool Works Co.....	Hamilton, O.

HATCH GEARS.

"Long Arm" System Co.....	Cleveland.
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HAWSERS, WIRE.

American Steel & Wire Co.....	Chicago.
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HEATING APPARATUS.

Sturtevant, B. F. Co.....	Boston.
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HOISTS FOR CARGO, ETC.

American Ship Building Co.....	Cleveland.
Brown Hoisting Machinery Co., Incorporated.....	Cleveland.
Chase Machine Co.....	Cleveland.
Elwell-Parker Electric Co.....	Cleveland.
General Electric Co.....	New York.
Hodge, S. F. & Co.....	Detroit.
Hyde Windlass Co.....	Bath, Me.
Lidgerwood Mfg. Co.....	New York.
Marine Iron Co.....	Bay City.
Westinghouse Electric & Mfg. Co.....	Pittsburg.

HOSE FOR PNEUMATIC TOOLS.

Sayen & Schultz.....	Philadelphia.
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HYDRAULIC MACHINERY.

Bement, Miles & Co.....	Philadelphia.
Watson-Stillman Co., The.....	New York.
Wood & Co., R. D.....	Philadelphia.

INDICATORS FOR STEAM ENGINES.

American Steam Gauge Co.....	Boston.
Ashton Valve Co.....	Boston.
Crosby Steam Gage & Valve Co.....	Boston.

IGNITERS FOR GAS ENGINES.

Holtzer-Cabot Electric Co.....	Brookline, Mass.
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INJECTORS.

Crane Co.....	Chicago.
Jenkins Bros.....	New York.

INSURANCE, MARINE.

Brown & Co.....	Buffalo.
Chamberlain & Co., S. R.....	Chicago.
Drake & Maytham.....	Buffalo.
Elphicke, C. W. & Co.....	Chicago.
Helm, D. T. & Co.....	Duluth, Minn.
Hutchinson & Co.....	Cleveland.
Keith, J. G. & Co.....	Chicago.
La Salle & Co.....	Duluth.
Mitchell & Co.....	Cleveland.
Osborn, F. H. & Co.....	Chicago.
Parker, A. A. & W. B.....	Detroit.
Peck, Chas. E. & W. F.....	New York and Chicago.
Richardson, W. C.....	Cleveland.
Sullivan, D. & Co.....	Chicago.

IRON ORE AND PIG IRON.

Bourne-Fuller Co.....	Cleveland.
Hanna, M. A. & Co.....	Cleveland.
Pickands, Mather & Co.....	Cleveland.

IRON OR STEEL STAYBOLTS, HOLLOW OR SOLID.

Falls Hollow Staybolt Co.....	Cuyahoga Falls, O.
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LATHES OF ALL KINDS.

Niles Tool Works Co.....	Hamilton, O.
Pratt & Whitney Co.....	Hartford, Conn.

LAUNCHES—NAPHTHA, ELECTRIC.

Gas Engine & Power Co.....	New York.
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LIFE PRESERVERS, LIFE BOATS, BUOYS, RAFTS, ETC.

Armstrong Cork Co.....	Pittsburg.
Drein, Thos. & Son.....	Wilmington, Del.
Kahnweiler's Sons, D.....	New York.
Lane & DeGroot.....	Brooklyn.

LIGHTS, SIDE AND SIGNAL.

Page Bros. & Co.....	Birmingham, Eng.
Porter's Sons' Co., Wm.....	New York.

LOGS.

Walker & Son, Thomas.....	Birmingham, Eng.
Also Ship Chandlers.	

MACHINE TOOLS (WOOD WORKING).

Atlantic Works, Inc.....	Philadelphia.
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MACHINE TOOLS.

Bement, Miles & Co.....	Philadelphia.
Niles Tool Works Co.....	Hamilton, O.
Pond Machine Tool Co.....	Plainfield, N. J.
Pratt & Whitney Co.....	Hartford, Conn.

MALLETS FOR CAULKERS, BOILER MAKERS, ETC.

N. Y. Mallet & Handle Works.....	New York.
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MARINE RAILWAYS, BUILDERS OF

Crandall & Son, H. I.....	East Boston, Mass.
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MATTRESSES, CUSHIONS, BEDDING.

Fogg, M. W.....	New York.

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BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

SPARS—LARGE SIZES.

Moran Bros. Co. Seattle, Wash.

STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.

Falls Hollow Staybolt Co. Cuyahoga Falls, O.

STEAM VESSEL FOR SALE.

Holmes, Samuel. New York.

STEAMSHIP LINES, PASS. AND FREIGHT.

American Line. New York.

Cleveland & Buffalo Transit Co. Cleveland.

Dominion Line. Boston.

Erie & Western Trans. Co. Buffalo.

International Nav. Co. Philadelphia.

Red Star Line. New York.

STEEL CASTINGS.

Seaboard Steel Casting Co. Chester, Pa.

STEERING APPARATUS.

American Ship Building Co. Cleveland.

Chase Machine Co. Cleveland.

Detroit Shipbuilding Co. Detroit.

Electro-Dynamic Co. Philadelphia.

Hyde Windlass Co. Bath, Me.

Jenks Ship Building Co. Port Huron, Mich.

Queen City Engineering Co. Buffalo.

Sheriffs Mfg. Co. Milwaukee.

STOCKS, BONDS, SECURITIES.

Wright, Herbert & Co. Cleveland.

STOCKLESS ANCHORS.

Balldt Anchor Co. Chester, Pa.

International Anchor Co. Cleveland.

SUBMARINE DIVING APPARATUS.

Hale Rubber Co., Alfred. So. Boston, Mass.

SURVEYORS, MARINE.

Gaskin, Edward. Buffalo.

See, Horace. New York.

Wood, W. J. Chicago.

TELEGRAPH—DECK AND ENGINE ROOM.

Cory, Chas. & Son. New York.

TESTS OF MATERIAL.

Hunt, Robert W. & Co. Chicago.

Pittsburgh Testing Laboratory, Ltd. Pittsburgh.

THERMOMETERS FOR MECHANICAL PURPOSES.

Helios-Upton Co. Peabody, Mass.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Bement, Miles & Co. Philadelphia.

Cleveland Punch & Shear Works Co. Cleveland.

New Doty Mfg. Co. Jamesville, Wis.

Niles Tool Works Co. Hamilton, O.

Pond Machine Tool Co. Plainfield, N. J.

Pratt & Whitney Co. Hartford, Conn.

Standard Pneumatic Tool Co. Chicago.

Watson-Stillman Co. New York.

Wood, R. D. & Co. Philadelphia.

TOOLS, WOOD WORKING.

Atlantic Works, Inc. Philadelphia.

TOPOPHONE—Prevents disasters in fogs.

Colt Co. J. B. New York.

TOWING MACHINES.

American Ship Windlass Co. Providence, R. I.

Chase Machine Co. Cleveland.

TOWING COMPANIES.

Donnelly Salvage & Wrecking Co. Kingston, Ont.

Midland Towing & Wrecking Co., Ltd. Midland, Ont.

Swain Wrecking Co. Detroit.

TRAPS, STEAM.

D'Este Co., Julian. Boston.

Haines Co., Wm. S. Philadelphia.

TRUCKS.

Boston & Lockport Block Co. Boston.

TUBING, SEAMLESS.

Benedict & Burnham Mfg. Co. Waterbury, Conn.

Standard Seamless Tube Co. Pittsburgh.

VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co. Boston.

Ashton Valve Co. Boston.

Crane Co. Chicago.

Crosby Steam Gage & Valve Co. Boston.

D'Este Co., Julian. Boston.

Jenkins Bros. New York.

Wood & Co., R. D. Philadelphia.

VARNISH PAINT.

Mair, John & Son. Philadelphia.

VESSEL AND FREIGHT AGENTS.

Boland, John J. Buffalo.

Brown & Co. Buffalo.

Chamberlain & Co., S. R. Chicago.

Drake & Maytham. Buffalo.

Elphicke, C. W. & Co. Chicago.

Erie & Western Trans. Co. 32

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D'Este Co., Julian. 3			*Wood & Co., R. D. 30
Delaware River Iron S. B. & E. Works. 5			Worthington, Henry R. 9
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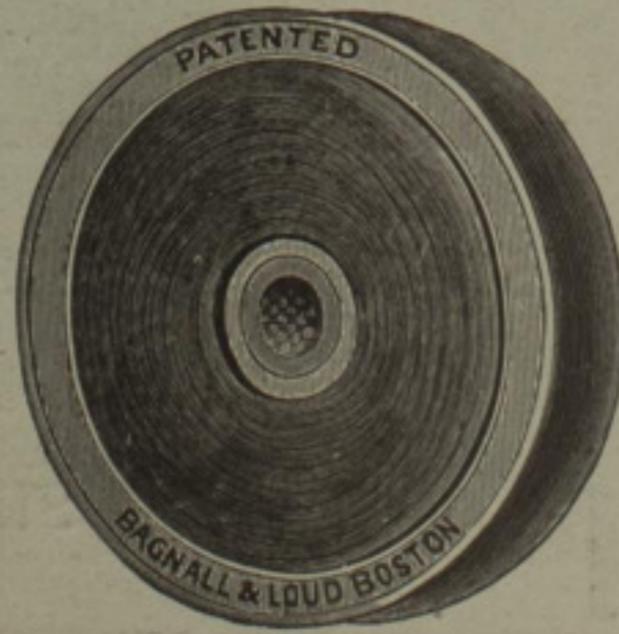
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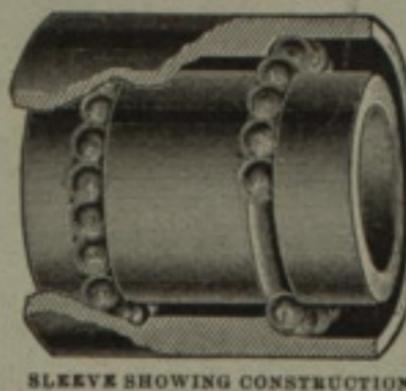
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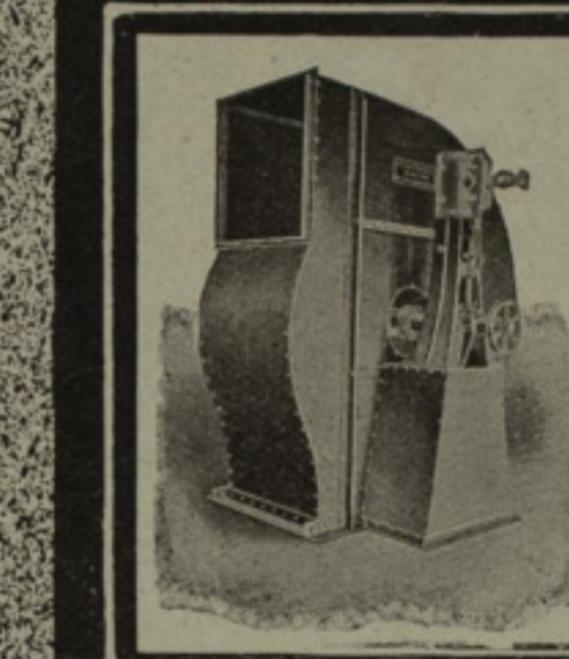
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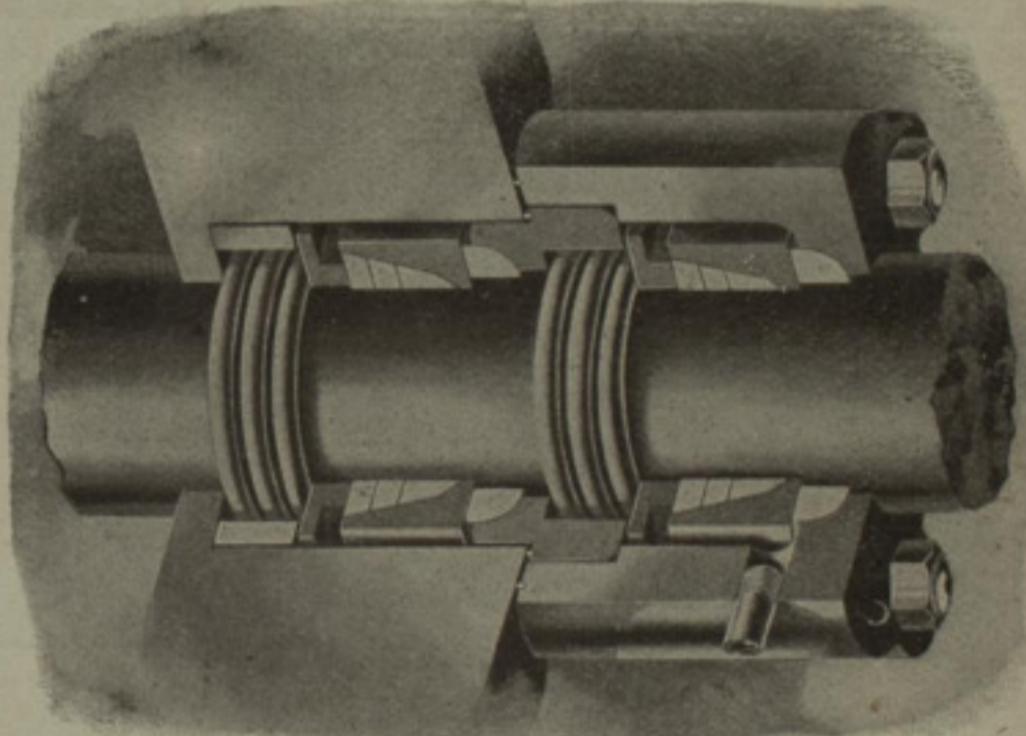
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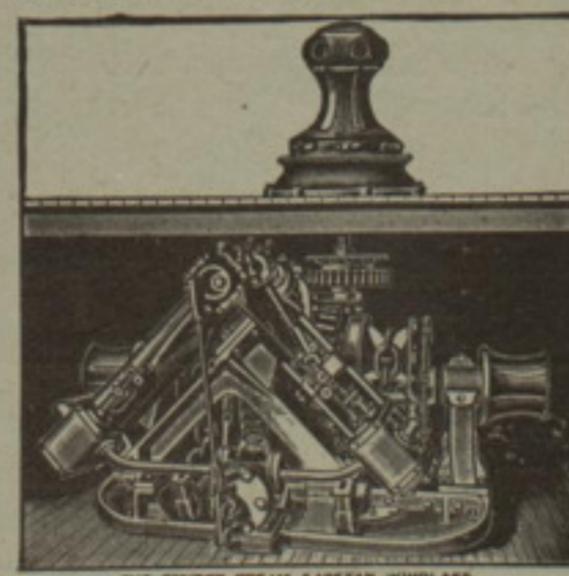


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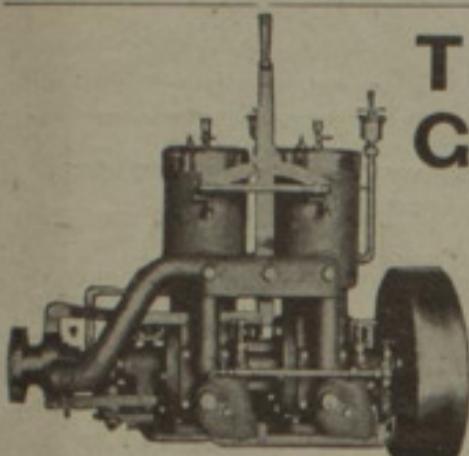
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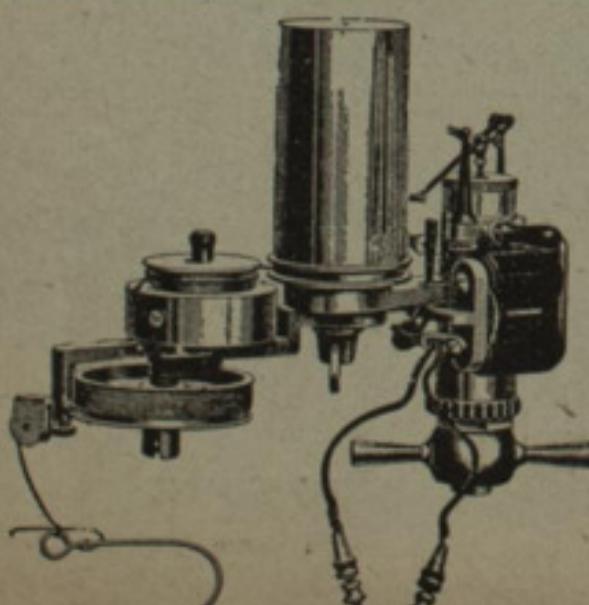
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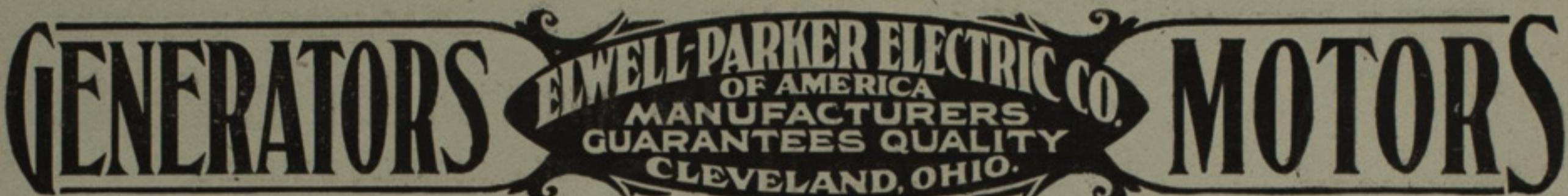
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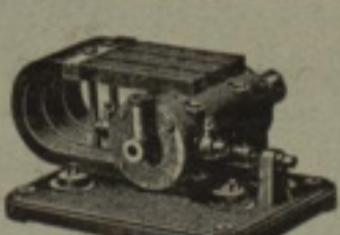


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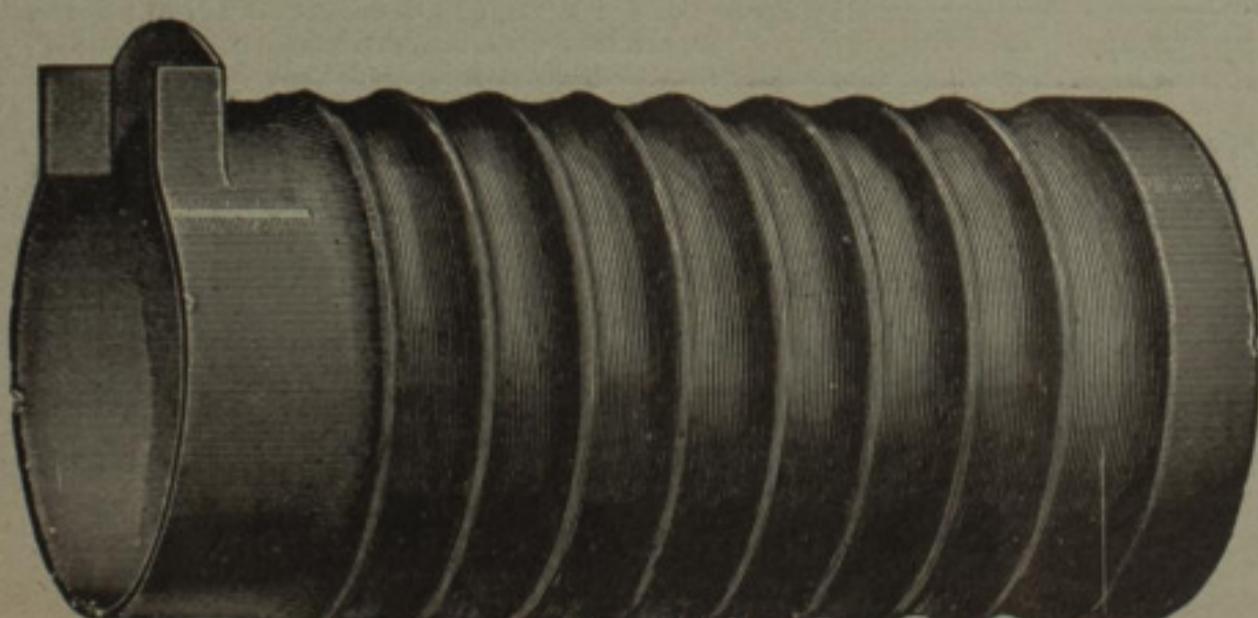
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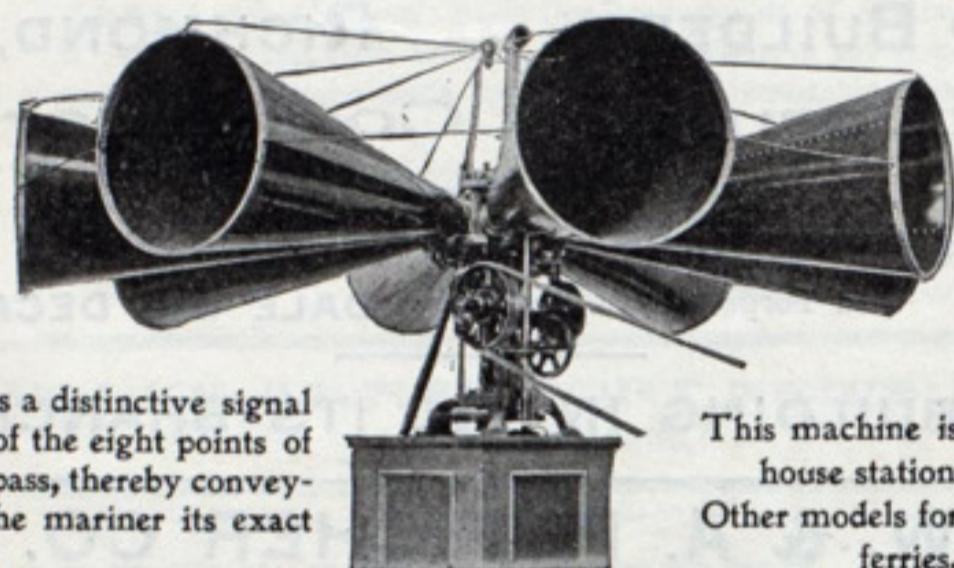
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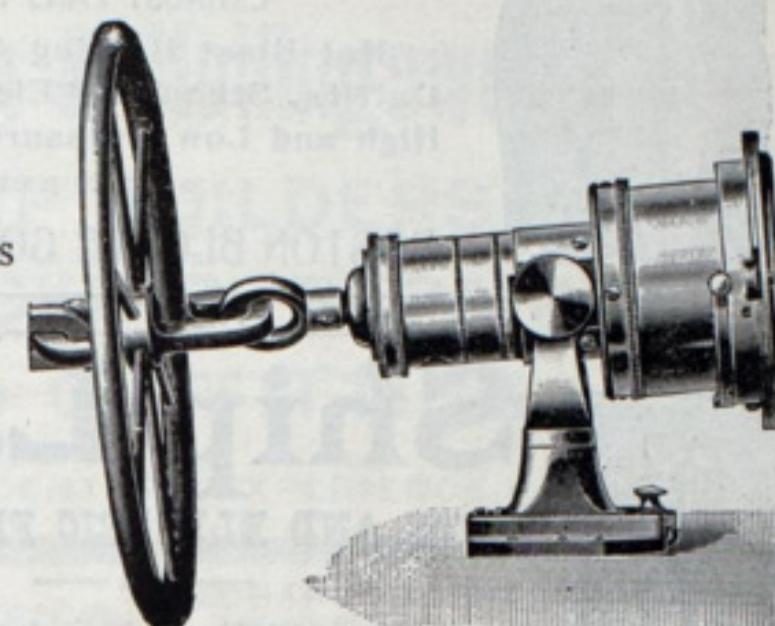
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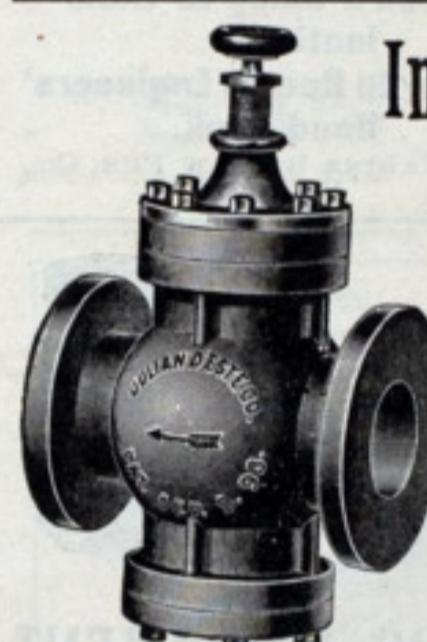
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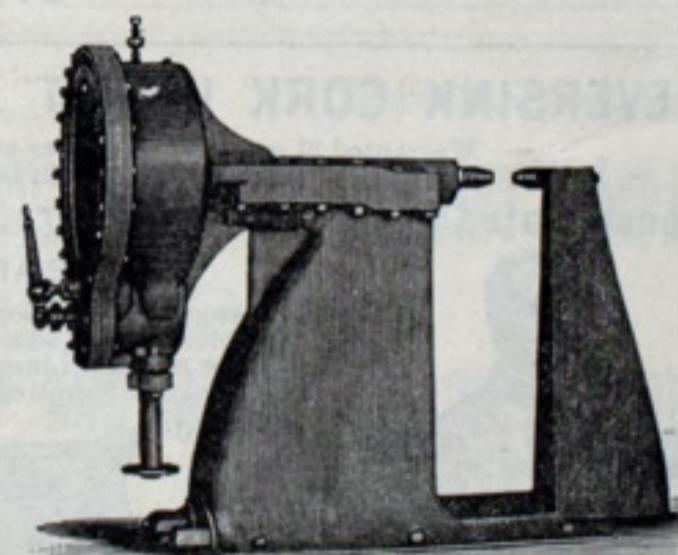
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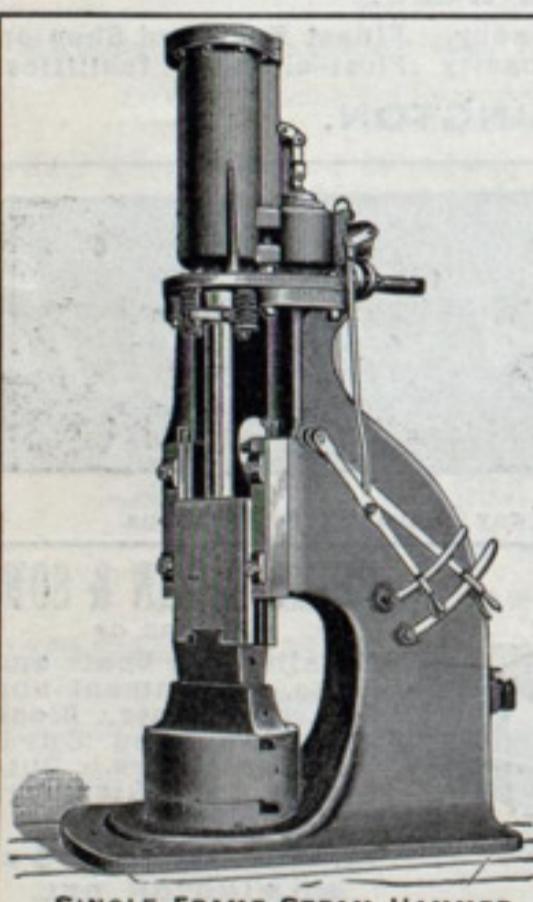
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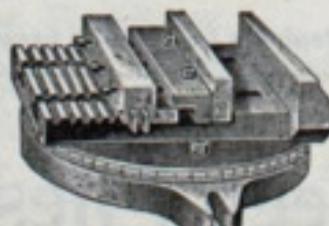
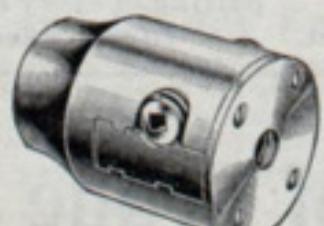


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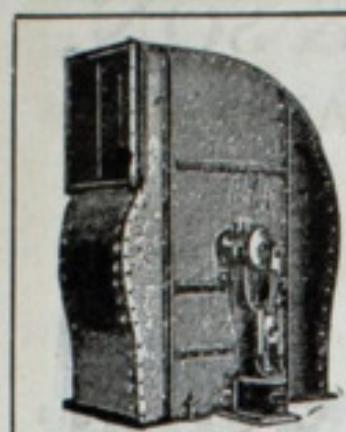
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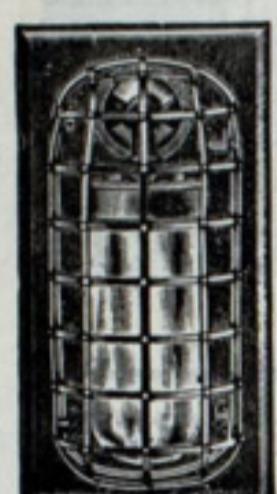
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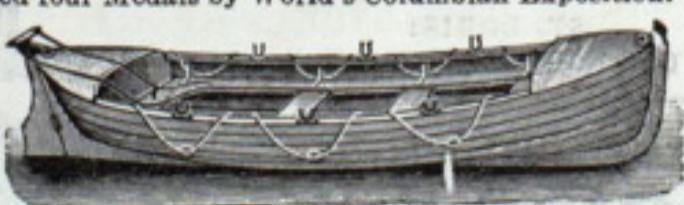
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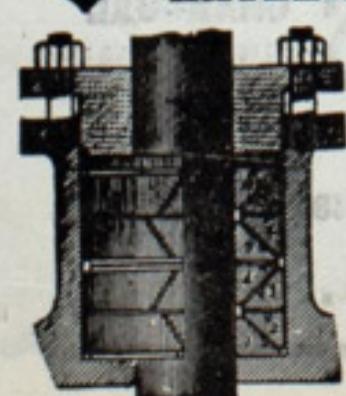
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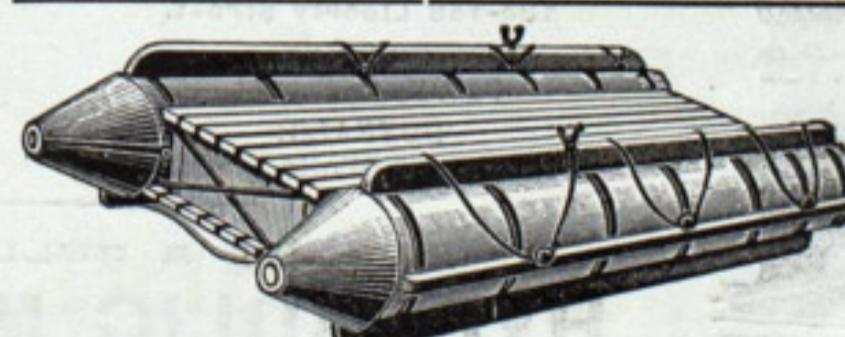
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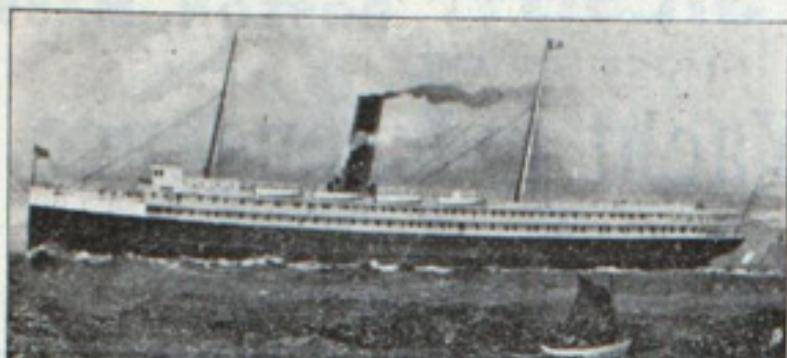
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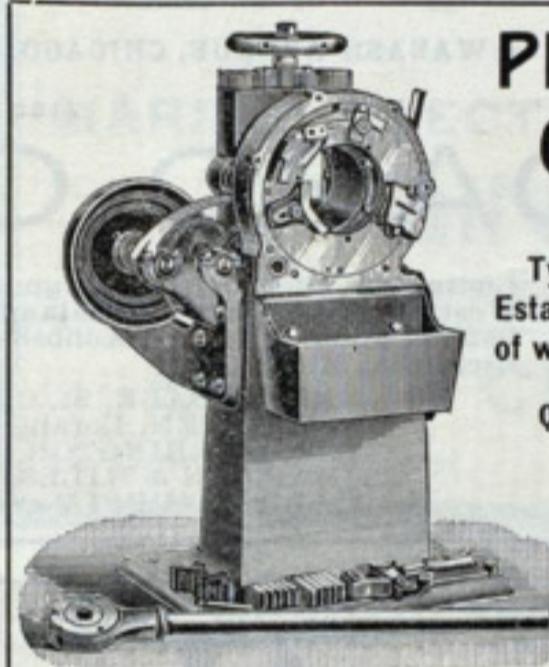
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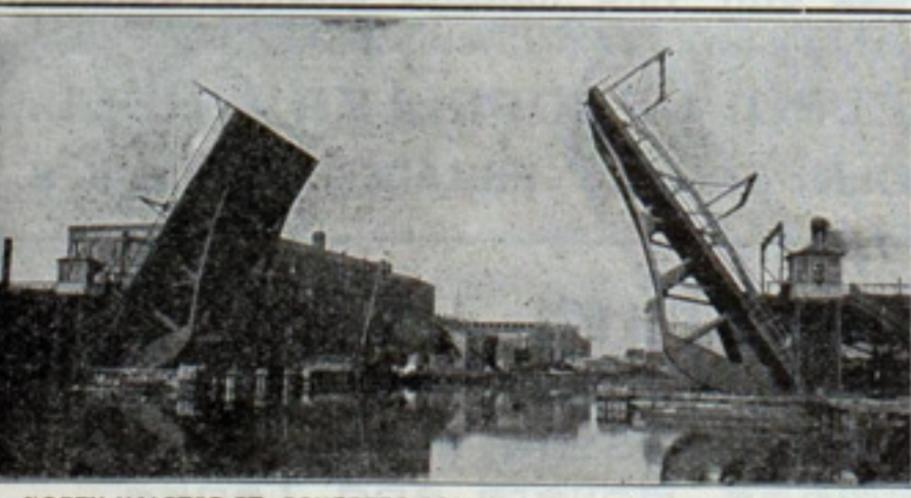
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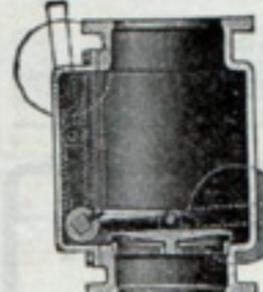
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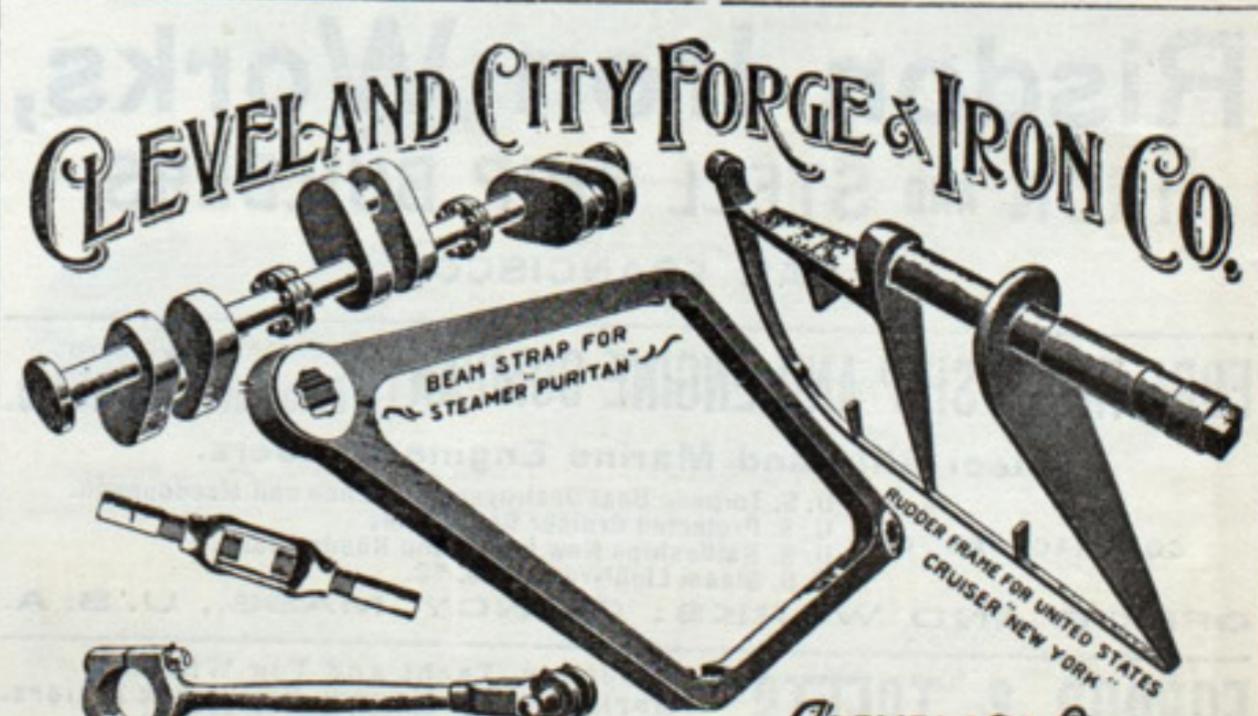
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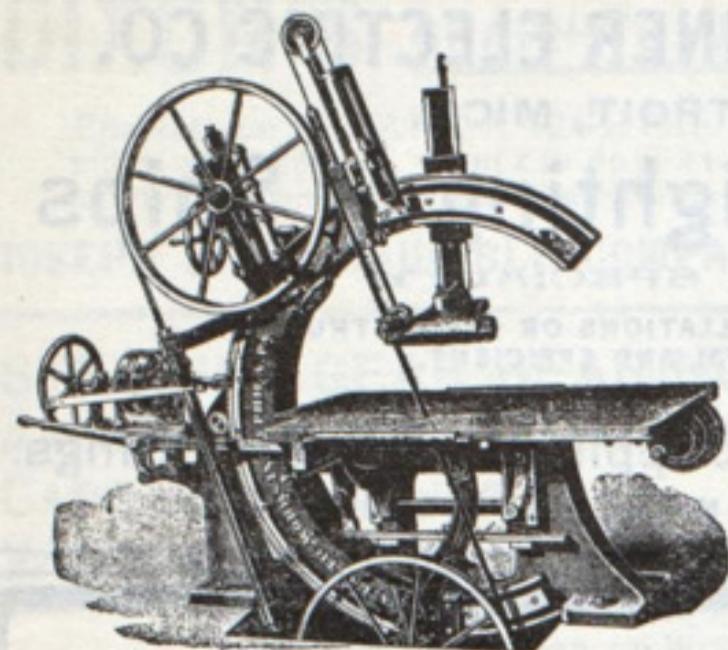
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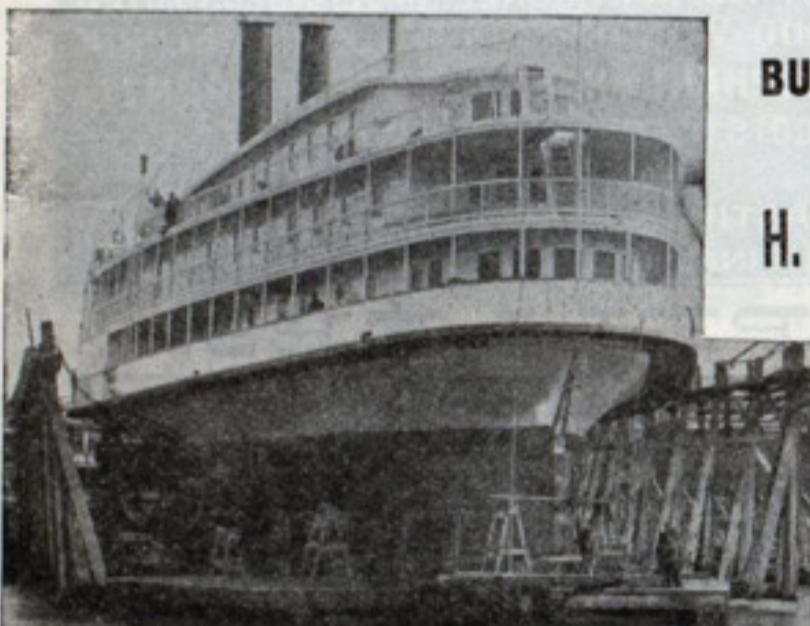
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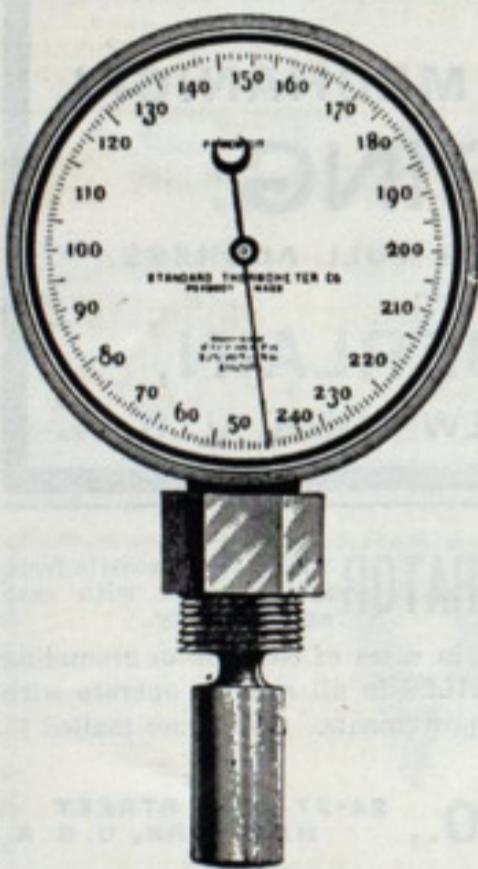
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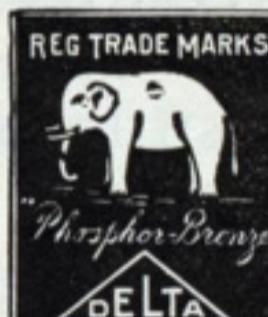
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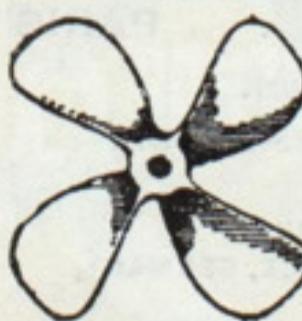
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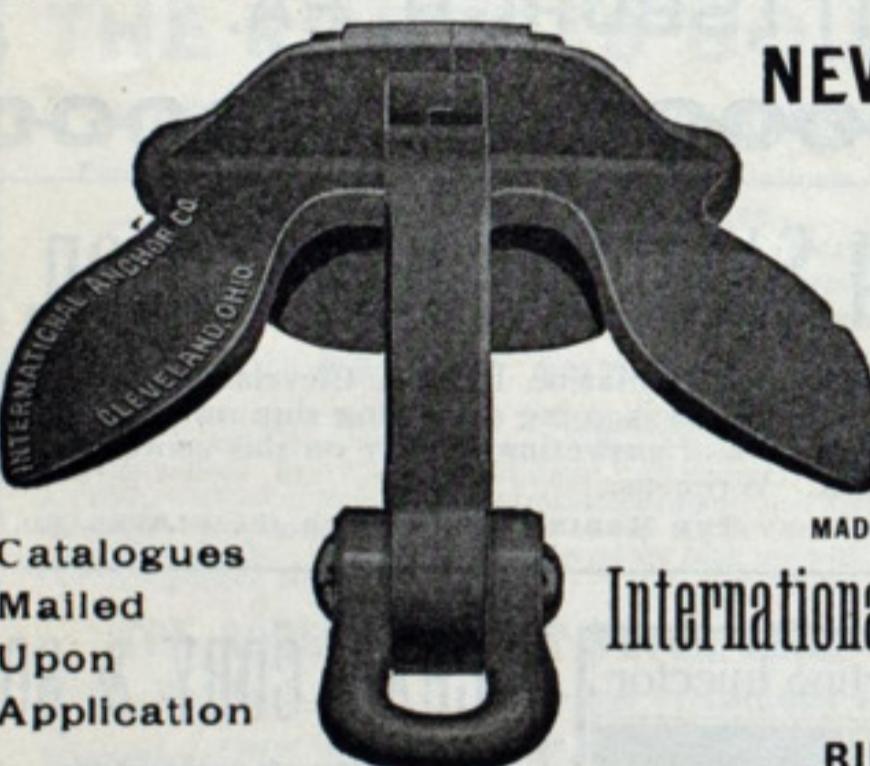
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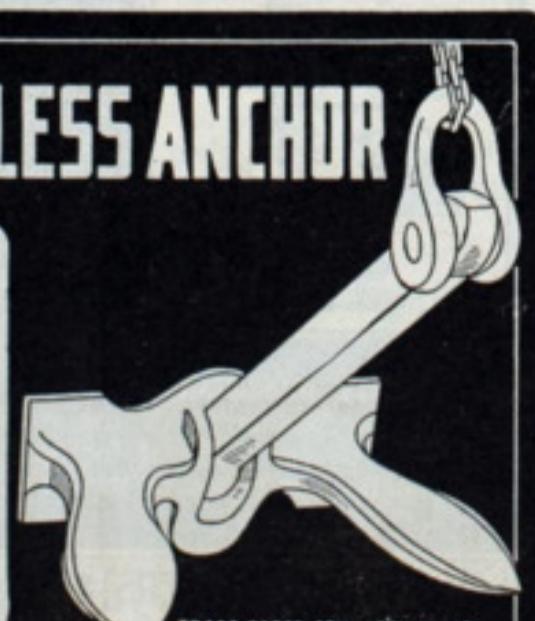


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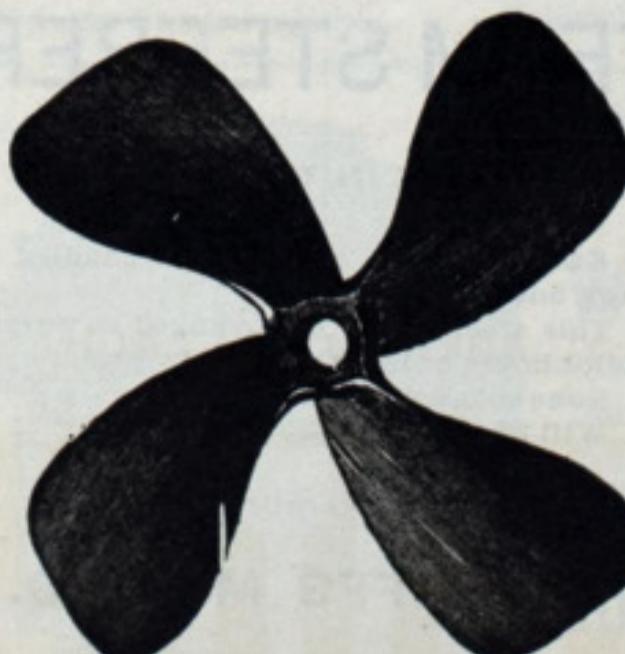
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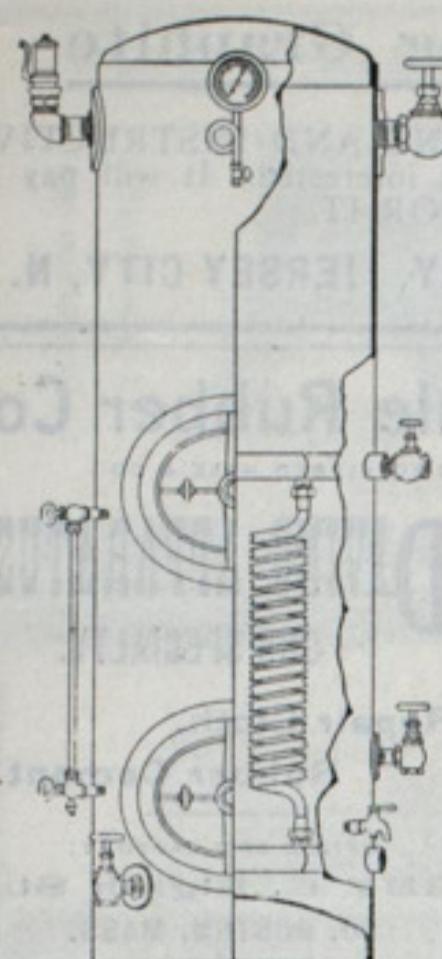
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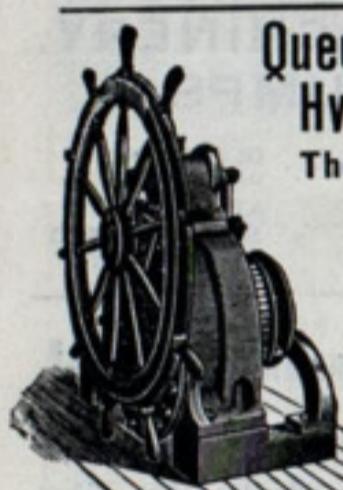
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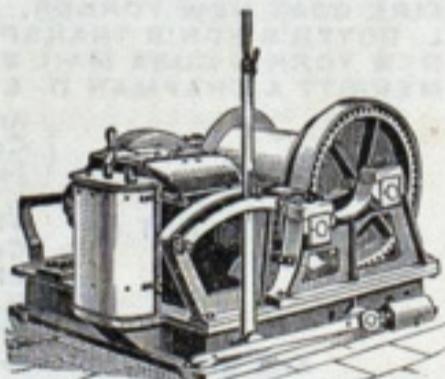
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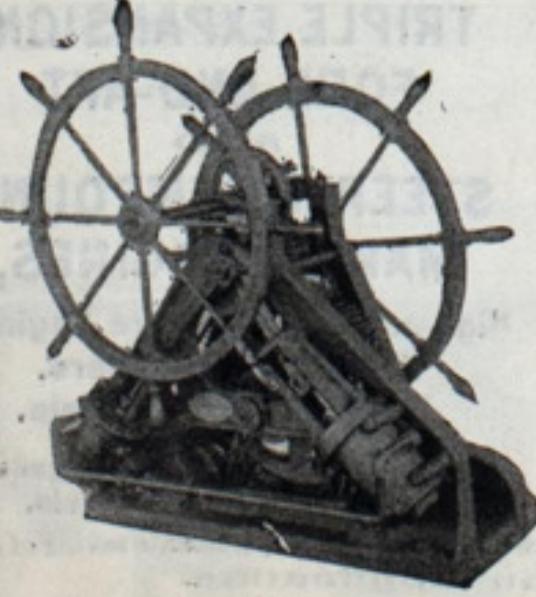
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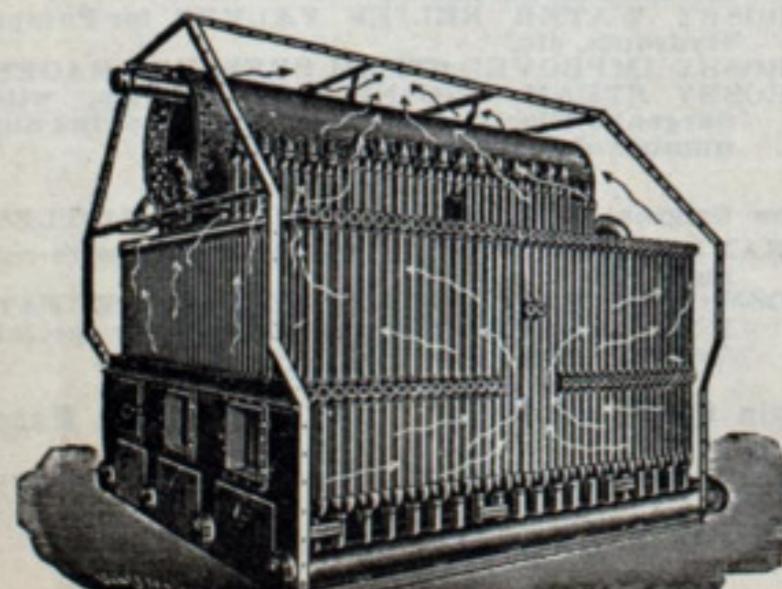
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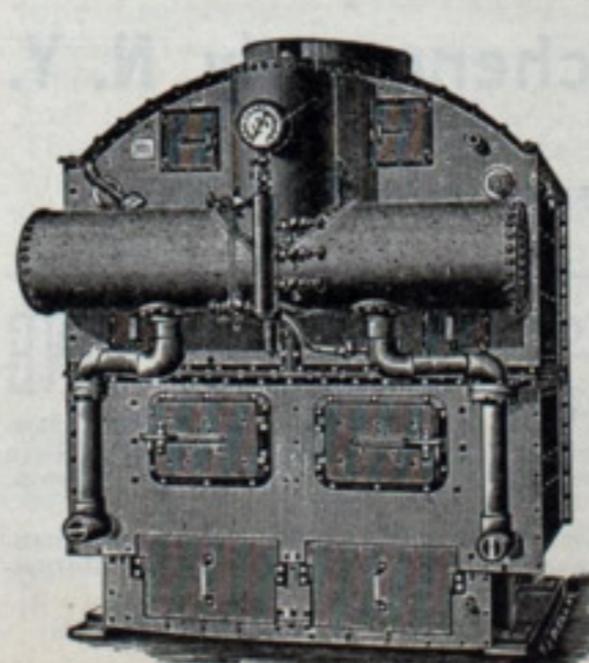
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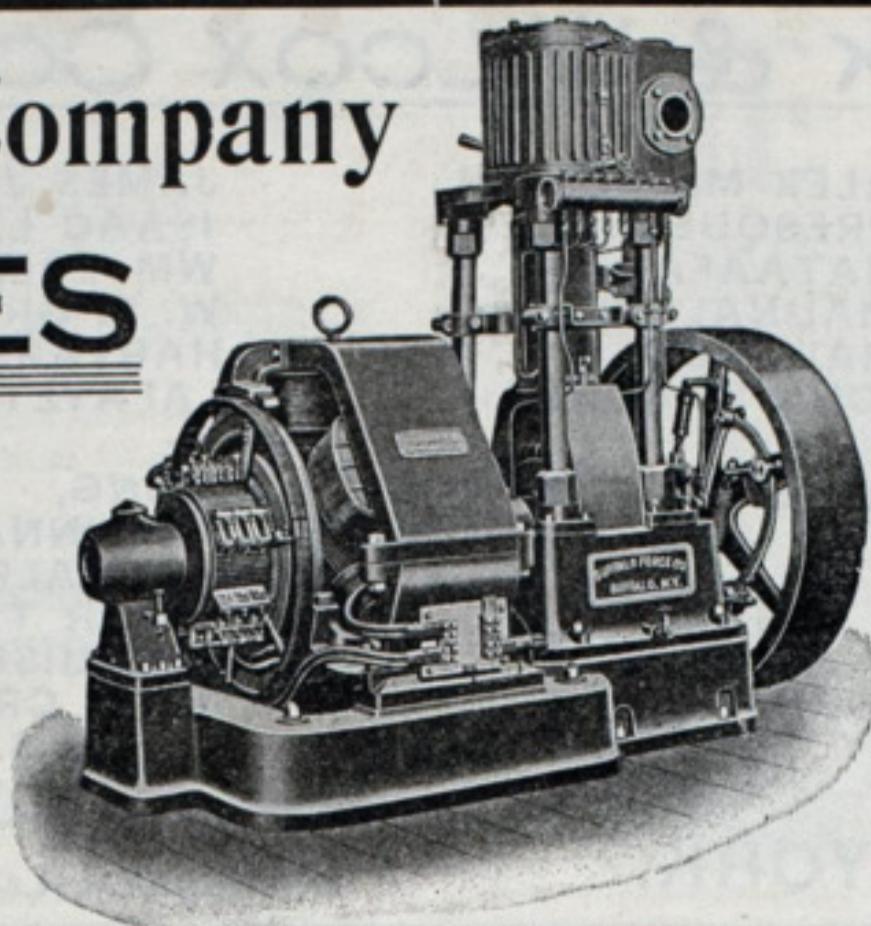
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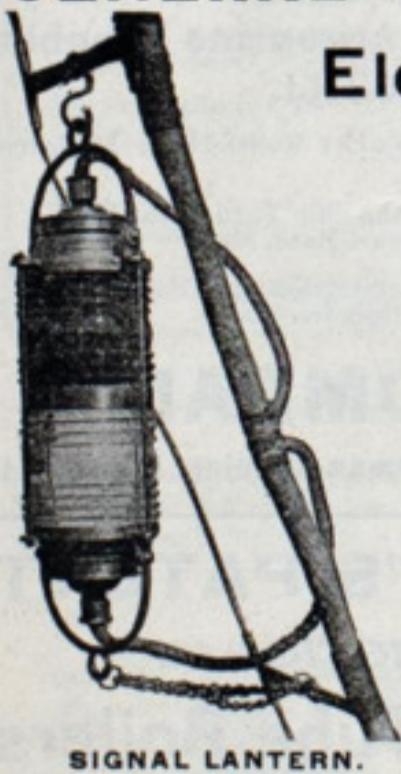


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